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No. 23

An Analysis of the Timber Situation in the United States 1952-2030

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An Analysis of the Timber Situation in the United States 1952–2030

This is the centennial of the first comprehensive analysis of the timber situation in the United States. Thus, this work is simply a continuation of efforts that began long ago. Accordingly, the authors dedicate it to all those who have worked on preceding analyses and especially to Franklin B. Hough, who prepared the first one, and to Edward C. Crafts and H. R. Josephson, who contributed greatly to the development of the methodology and structure of such analyses in the 1950's and 1960's.

An Analysis of the Timber Situation in the United States 1952-2030

United States Department of Agriculture
Forest Service

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No. 23
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Foreword

A hundred years ago, the first comprehensive analysis of the timber situation in the United States was published. In response to the problems and opportunities described in this and later studies, public and private investments in timber management, assistance, and research programs have slowly increased from virtually nothing to over $2 billion a year. These programs have resulted in large increases in timber growth and made possible such important developments as the establishment and rapid expansion of the pulp and paper and softwood plywood industries in the South. The physical depletion of the Nation's timber resources, in prospect when the earliest studies were made, is no longer in the offing.

Although there has been much progress, there is little likelihood of a timber surplus. The projections in this study show that our demands for timber are likely to grow rapidly. They also show that the supplies of timber available to meet these demands will increase, but more slowly. As a consequence, we face intensifying competition for timber and continuing increases in stumpage and timber product prices.

Consumers will suffer the greatest losses from rising prices of timber products. By 2030, for example, they will be paying some $7 billion more for wood products and competing materials because of the lack of enough timber to maintain prices of softwood lumber and plywood at recent levels.

There are also likely to be significant adverse effects on the forest resource, the primary timber processing industries, employment in forested regions, housing construction, the environment, international trade in timber products, and nonrenewable resources.

This outlook can be changed. We have a large commercial timberland base—482 million acres in 1976. Net annual timber growth on this land is much below biological and economic potentials. There are also opportunities to increase the utilization of wood in our forests, improve efficiency of use in manufacturing and construction, and extend the service life of timber products and wood structures. With more intensive management and improved utilization, enough timber can be provided to meet foreseeable domestic and export demands.

Moving forward to achieve this goal will require large public and private investments in management, assistance, and research programs. However, when the economic, social, and environmental benefits are considered, these investments are likely to be profitable from the standpoint of the society and the economy.

Thus, we have an opportunity, and if we take it, we can assure our Nation a continuing and abundant supply of a basic raw material and improve the quality of life for future generations.

R. MAX PETERSON
Chief, Forest Service

Acknowledgments

Many people in the Forest Service, other Federal agencies, State forestry agencies, universities, and forest industry associations and companies have contributed in significant ways to this study. The names of the principal and substantive contributors to the individual chapters and appendices are listed below.[1] The help of all others, and especially that of the staffs of the Resources Evaluation Work Units at the Forest and Range Experiment Stations and the Timber Management staffs in the Regional Offices who compiled the basic data on the forest resource shown in Appendix 3 and contributed in other ways, is gratefully acknowledged.

The principal authors of Chapter 1, Economic Importance of Timber in the United States, were Dwight Hair and Robert B. Phelps.

The principal authors of Chapter 2, Basic Assumptions, were Dwight Hair and Perry R. Hagenstein (New England Natural Resources Center).

The principal author of Chapter 3, Demand for Timber, was Robert B. Phelps. Other substantive contributors included Thomas C. Marcin, H. Edward Dickerhoof, William H. Reid, Thomas H. Ellis, David B. McKeever and Duane F. Zinkel.

The principal authors of Chapter 4, International Trade in Timber Products, were David R. Darr and Gary R. Lindell. Substantive information on the Canadian timber–demand–supply situation was provided by F. L. C. Reed (Canadian Forestry Service), J. Ottens (Canadian Forestry Service) and Keith L. Aird (Canadian Forestry Service).

The principal authors of Chapter 5, Primary Timber Processing Industries, were David B. McKeever and Robert N. Stone. Paul V. Ellefson (University of Minnesota) was a substantive contributor.

The principal author of Chapter 6, Domestic Timber Resources, was Dwane D. Van Hooser. Other substantive contributors included Neal P. Kingsley, Paul A. Murphy, Alan W. Green and Charles L. Bolsinger.

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The principal authors of Chapter 9, Opportunities for Increasing Timber Supplies, were: Michael J. Skinner—Recent Trends in Management, Research and Assistance Programs, Stephen G. Boyce—Biological and Research Opportunities; George F. Dutrow, Joseph M. Vasievich, and Merle E. Conkin (National Forest Products Association)—Economic Opportunities; Neal P. Kingsley—Importance of Forest Ownership; and Edward C. Thor—Environmental and Renewable Resource Impacts.

The principal authors of Chapter 10, Opportunities for Extending Timber Supplies were Thomas H. Ellis, Gary R. Lindell and Alan A. Marra.

Appendix 1, Timber Product Price, Production, Trade and Consumption Statistics of the U.S., was prepared by Alice H. Ulrich and Robert B. Phelps with the assistance of Peggy Gwinn.

Appendix 2, Timber Import and Export Statistics of the U.S., was prepared by Alice H. Ulrich with the assistance of Peggy Gwinn and Florence K. Ruderman.

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Appendix 4, Timber Resource Projections—Methodology and Supporting Detailed Tables, was prepared by Thomas J. Mills and Ralph J. Alig.

Appendix 5, Converting Factors, was prepared by James T. Micklewright.

Appendix 6, Glossary, was prepared by Dwane D. Van Hooser, Daniel D. Oswald and Charles C. Van Sickle.

The planning and general direction of the study and much of the final drafting were by Dwight Hair. Perry R. Hagenstein (New England Natural Resources Center), John Fedkiw (Office of Budget Planning and Evaluation), Alice H. Ulrich, Susan J. Branham, James T. Micklewright, Peggy Gwinn, Cherilyn Hatfield, Dorothy G. Felt and Clara Seko also made significant general contributions.

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[1] Contributors are members of the Forest Service unless otherwise noted.

Preface

As a matter of ordinary prudence, the formulation and direction of public and private timber policies and programs should be based on an analytical assessment of the current and prospective timber situation.

This has long been recognized by Congress and by others interested in the administration, management, and use of the Nation's forest lands. Congressional interest was first expressed in the Appropriations Act of August 15, 1876, which appropriated $2,000 for the employment of an expert to study and report upon forest conditions.[1] In the next five decades, there were a number of other Congressional directives for studies on an as-needed basis. This was followed in 1928 by the passage of the McSweeney-McNary Act which directed the Secretary of Agriculture to assess on a continuing basis the forest situation in the United States.[2]

The assessment provision of this Act was amended and broadened to include renewable resources of forest and range lands by the Renewable Resources Planning Act of 1974, the National Forest Management Act of 1976, and the Forest and Rangeland Renewable Resources Research Act of 1978. To ensure the availability of adequate data and scientific information needed for the development of periodic Renewable Resources Assessments required by the Renewable Resources Planning Act, Section 3(b) of the Renewable Resources Research Act of 1978 directs the Secretary of Agriculture to:

> . . . make and keep current a comprehensive survey and analysis of the present and prospective conditions of and requirements for the renewable resources of the forest and rangelands of the United States and of the supplies of such renewable resources, including a determination of the present and potential productivity of the land, and of such other facts as may be necessary and useful in the determination of ways and means needed to balance the demand for and supply of these renewable resources, benefits and uses in meeting the needs of the people of the United States.

This study implements this directive with respect to timber. In response to direction in the National Forest Management Act, it also includes a discussion of additional fiber potential in the Nation's forests, opportunities for increased utilization and recycling of forest, processing, and urban wood and fiber residues; primary wood manufacturing and processing facilities; the impact of the export and import of logs upon domestic timber supplies and prices; and the role of urban areas in meeting demands for wood fiber.[3]

The major findings of this study are summarized as a chapter in the comprehensive assessment of the renewable resources of forest and range lands prepared in response to the direction in the Renewable Resources Planning Act as amended by the National Forest Management Act.[4] That comprehensive assessment also includes chapters on wildlife and fish, outdoor recreation and wilderness, range grazing and water. Potential multiresource interactions resulting from changes in management activities are also discussed.

This assessment of the timber situation has objectives similar to most of the preceding assessments that have been made.[5] In addition, the structure,

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[1] Hough, Franklin B. Report upon forestry. Govt. Print. Off., Washington, D.C.; vol I, 650 p., 1878; vol. II, 618 p., 1880; vol. III, 318 p., 1882.

[2] Section 9 of this Act authorized and directed the Secretary of Agriculture to cooperate with States, private owners, and other agencies: ". . . in making and keeping current a comprehensive survey of the present and prospective requirements for timber and other forest products in the United States, and of timber supplies, including a determination of the present and potential productivity of forested land therein and of such other facts as may be necessary in the determination of ways and means to balance the timber budget of the United States."

[3] This discussion is included as a response to the direction in Section 3(c) and Section 5(5)(E) of the Renewable Resources Planning Act as amended by The National Forest Management Act.

[4] U.S. Department of Agriculture, Forest Service. An assessment of the forest and range land situation in the United States. Washington, D.C., 631 p. 1980.

[5] Following is a list of the reports on the timber situation which, in at least a limited sense, can be considered as predecessors to the present study.

Star, Frederick, Jr. American forests: their destruction and preservation. Rep. of the Commissioner of Agriculture, 1865. Govt. Print. Off., Washington, D.C., p. 210–234. 1866.

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Brewer, William H. The woodlands and forest systems of the United States. In U.S. Census, Statistical Atlas of the United States, 1870. Govt. Print. Off., Washington, D.C. 1874.

U.S. Commissioner of Agriculture. "Statistics of Forestry" Rep. of the Commissioner of Agriculture, 1875. Govt. Print. Off., Washington, D.C., p. 244–358. 1876.

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Sargent, Charles S. Report on the forests of North America (exclusive of Mexico). Vol. 9 of the Tenth Census of the United States, 1880. Dep. Interior, Census Off., Govt. Print. Off., Washington, D.C., 612 p. 1884.

Kellogg, R. S. The timber supply of the United States. U.S. Dep. Agric., Forest Serv., Cir. 166, Govt. Print. Off., Washington, D.C., 24 p. 1909.

Zon, Raphael. The forest resources of the world. U.S. Dep. Agric., Forest Serv., Bull. 83, Govt. Print. Off., Washington, D.C., 91 p. 1910.

U.S. Department of Commerce and Labor, Bureau of Corporations. Summary of report of the Commissioner of Corporations on the lumber industry. Govt. Print. Off., Washington, D.C., 38 p. 1911.

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Part III. Land holdings of large timber owners (with ownership maps). 264 p. 1914.

U.S. Department of Agriculture, Forest Service. Timber depletion, lumber prices, lumber exports, and concentration of timber ownership. Rep. on S. Res. 311, 66th Cong., 2nd sess., Govt. Print. Off., Washington, D.C., 71 p. 1920. (The Capper Report.)

Greeley, W. B. and E. H. Clapp, et. al. Timber: mine or crop? In U.S. Dep. Agric., Agric. Yearbook—1922, Govt. Print. Off., Washington, D.C., p. 83–180. 1923.

Clapp, E. H. and C. W. Boyce. How the United States can meet its present and future pulpwood requirements. U.S. Dep. Agric., Dep. Bull. 1242, Govt. Print. Off., Washington, D.C., 100 p. 1924. (The Clapp-Boyce report.)

methodology, and much of the historical base developed in earlier assessments, and particularly those immediately preceding, have been carried forward with modifications and refinements. As has been the case with each successive study, this one is more reliable and comprehensive because of improvements in analytical methods and the availability of more information.

The study can be roughly divided into five major parts. The first of these is concerned with the major markets and the use of timber products in these markets. It contains statistics on and analyses of trends in activity in large markets such as housing and manufacturing, trends in the use of major timber products such as lumber, plywood, and paper and board, and related data on production and prices. It also includes a statistical description and analysis of U.S. imports and exports of timber products and the prospective timber demand-supply situation in the important timber importing and exporting countries.

This information is useful in a number of ways. It provides a factual basis for analyzing trends in prices and in domestic and international markets and for appraising the need for and economic feasibility of expanding timber product manufacturing facilities. In addition, and as indicated below, it provides the material required for projecting future trends in demands for the major products, imports and exports, prices, and demands upon domestic forests.

The second major part of the study is a description of the timber resource. This includes detailed statistics on the extent, location, ownership, condition, and productivity of the Nation's commercial timberland and timber inventory, together with an analysis of recent trends in area, inventories, growth and removals. This information on the national, sectional, and regional timber situation summarizes and supplements the information published from the periodic surveys of forest resources of individual States conducted by the Forest Service in cooperation with various State agencies and private organizations.[6]

The detailed information on the timber resource provides a basis for judging the result of ongoing forestry programs such as fire protection and reforestation. It also presents the information needed to identify the States and regions where timber resources can support additional harvesting and the associated manufacturing facilities. And finally, it provides the statistical base for projecting trends in timber supplies from domestic forests.

The third part of the study is the timber demand and supply projections. The demand projections show the volume of timber products that would be consumed under the assumptions on future changes in population, economic

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Part III. Agricultural land requirements and resources. 64 p. 1935.

Part VII. Certain aspects of land problems and government land policies. 139 p. 1935.

Part VIII. Forest land resources, requirements, problems, and policy. Prepared by Forest Service for National Resources Board. 114 p. 1935.

Part IX. Planning for wildlife in the United States. 24 p. 1935.

Part XI. Recreational use of land in the United States. Prepared by National Park Service for National Resources Board. 280 p. 1938.

Curran, C. E. and E. E. Behre. National pulp and paper requirements in relation to forest conservation. S. Doc. 115, 74th Cong., 1st sess., Govt. Print. Off., Washington, D.C., 74 p. 1935.

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Report 1. Gaging the timber resource. 62 p. 1946; rev. 1947. (Processed.)

Report 2. Potential requirements for timber products. 70 p. 1946; rev. 1947. (Processed.)

Report 3. The management status of forest lands. 39 p. 1947; rev. 1948. (Processed.)

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Report 5. Protection against forest insects and diseases. 39 p. 1947; rev. 1948. (Processed.)

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U.S. Department of Agriculture, Forest Service. The outlook for timber in the United States. Forest Res. Rep. 20, Govt. Print. Off., Washington, D.C., 367 p. 1974.

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[6] The basic statistics on the forest resources of States presented in Appendix 3 are an updated summary of the information collected and published as a part of these State surveys.

activity, income, energy costs, technology, institutions, and prices. These product demand projections, after allowances for projected imports and exports and conversion to common units —cubic feet of roundwood and board feet for sawtimber—provide a measure of the demand for timber from domestic forests. The timber supply projections show the volume of timber that would be harvested under the assumptions on timber growth and mortality; relationships between private timber harvests, stumpage prices, and inventory levels; planned allowable harvest on public lands; commercial timberland areas; and environmental and other constraints which influence timber harvests. In a general sense, the supply projections show the volume of timber that will be available for harvest if owners respond to price and inventory changes and manage their lands much as they have in the recent past.

These demand-supply projections provide the basis for identifying future imbalances between the volume of timber that would be consumed and supplied under the given assumptions on demand and supply determinants. These projections also provide a basis for estimating prospective changes in relative prices of timber and timber products, i.e., the changes necessary to bring about an equilibrium between the projected demands and supplies.

The projections of timber demands and supplies and of equilibrium prices provide guidance for many decisions on long-range commitments such as the construction of timber based manufacturing plants or investments in reforestation or other management practices whose effects are realized over an extended period of time. The changes in relative prices also provide a basis for analyzing the economic, social, environmental, and resource impacts which would result from a continuation of recent timber management policies and programs.

This impact analysis is the fourth major part of the assessment. It is the basis to determining whether to continue existing policies and programs or to change them in ways which are perceived to be more desirable from the standpoint of the economy and the society.

The fifth and last major part of the study is a description of the opportunities to increase and extend future timber supplies through changes in timber policies and programs. Recommendations for specific policy on changes lie beyond the scope of the analysis. The descriptive material on opportunities, however, is used as the basis for appraising policy options and the development of Forest Service timber programs as required by the Renewable Resources Planning Act of 1974 and the National Forest Management Act of 1976.[7] It also provides the essential information for assessing policy options and the development of programs by other Federal agencies, States, and private organizations.

Beyond the development of the Forest Service Program, there is no way of determining at this time how the material in this study will be used. However, in retrospect, it seems clear that past assessments of this kind have played an important role in the development and guidance of public and private timber policies and programs. They have defined timber problems, aroused public interest, and provided a factual and analytical foundation for policies and programs which have had profound impacts upon the way the Nation's timber resource is managed. This is evident in the records of hearings held before Federal and State legislative committees on forestry legislation and the budget statements prepared by forestry agencies requesting funds for timber programs. The available information suggests that the recent timber studies have been used in much the same way in the private sector—to identify prospective timber supply problems and as a factual and analytical base for justifying the establishment and funding of timber programs.

But perhaps most important of all, past studies have demonstrated that timber policies and programs are not necessarily destined to blow aimlessly before the changing winds. These studies have realistically appraised the trends of the times and to an increasing degree the costs that would be associated with a continuation of those trends. They have also shown that the outlook could be changed. Thus, they have provided legislators, administrators, and managers with a choice—they could accept the economic, social, and environmental consequences which would result from a continuation of existing policies and programs or they could take action to change policies and programs in ways which would be of greater benefit to the economy and the society.

Over time, the choice has clearly been to take action. Public and private investments in management, assistance and research programs related to increasing timber growth and improving utilization have slowly increased, and today are around $2 billion a year. These investments have greatly changed the timber outlook. They have led to effective fire protection, technical and financial assistance to small forest owners, the establishment of public forests and of comprehensive research. These programs in turn have contributed in major ways to the buildup of timber growth in the eastern United States of recent decades and made possible such important developments as the establishment and growth of the pulp and softwood plywood industries in the South. The physical depletion of the Nation's timber inventories, which was in prospect in the late 1800's and the early decades of the 1900's, is no longer a likely possibility.

Further, timber has continued to be an important resource. Currently about 4 percent of the gross national product originates in some form of timber-based economic activity. It composes about a quarter of all the industrial raw materials consumed in the economy. Millions of workers are employed in processing wood products, many in rural areas where timber is the principal raw material available to support the local economy. It contributes in various ways to the quality of life of all members of the society.

In recent years, the growing concern over the environment and depletion of energy resources has emphasized in other ways the importance of timber because the pollution impacts and energy requirements associated with the use of timber products are less than those of competitive materials. Unlike most competitive materials, timber is a renewable resource, and with further investments in management, assistance and research programs, output can be greatly increased and maintained for future generations. This can also be done in ways which will protect the natural environment.

[7] For the latest program submitted to Congress as required by these Acts, see U.S. Department of Agriculture, Forest Service. A recommended renewable resources program—1980 update. Washington, D.C. 1980.

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In the simplest terms, the purpose of this study is to analyze the timber resource situation in ways which will show developing timber resource problems, and do this in time to formulate and adopt policies and programs that will change the outlook if this seems to be desirable to the society.

Given this broad objective, the study is primarily concerned with prospective trends in demands and supplies of timber; the economic, social, and environmental implications of these trends; the land and timber resource base; and the opportunities to manage and use this resource base to enhance the quality of life for present and future generations.

An analysis of this kind must be based on a series of assumptions about the basic determinants of timber demands and supplies such as growth in population, economic activity, and income; technological and institutional changes; energy costs; capital availability; prices of stumpage and timber products; and investments in management, utilization, assistance, and research programs.

In making assumptions about these basic determinants, it is recognized the longrun course of events may be quite different from what is assumed.[1] However, trends in these determinants are the result of massive economic, social, and political forces which are not easily or quickly changed. Barring major catastrophes, such as a world war, such trends are likely to continue over a considerable time. Thus, it is reasonably certain that the given basic assumptions provide a realistic basis for preparing an analysis for use in developing and guiding timber policies and programs in the 1980's. Near the end of that decade, another study will be prepared. At that time, the basic assumptions will be reevaluated and new expectations incorporated.

(1) *Substantial growth is anticipated in population, economic activity, and income.* The population of the United States has grown by about 97 million people in the last five decades reaching 220 million in 1979. The most recent projections of the U.S. Department of Commerce, Bureau of the Census, indicate that population is likely to continue to grow fairly rapidly during the next 50 years. The Census Series II projection—the medium projection of this study—shows population rising by another 80 million to 300 million in 2030. In line with recent trends, however, the annual rate of growth will decline from an annual rate of about 1 percent in the late 1960's and early 1970's to 0.3 percent in the 2020–2029 decade.

The gross national product, measured in constant 1972 dollars, increased more than four times between 1929 and 1978 to $1,386 billion. Projections prepared by the U.S. Department of Commerce, Bureau of Economic Analysis, show near doubling of it to $2,690 billion (1972 dollars) in 2000 and a continued rise to $5,160 billion in 2030—some 3.7 times that of 1978. The associated projection of per capita gross national product in 2030 is $17,180—nearly triple the 1978 average.

Disposable personal income, i.e., the income available for spending by the Nation's population, is projected to grow from about $960 billion in 1978 to $3,610 billion (1972 dollars) in 2030. Associated per capita disposable income rises to $12,020 in 2030, some 2.7 times the 1978 average. Growth of the magnitude indicated by those projections means that the Nation is faced not only with the task of meeting the resource demands of an additional 80 million people, but the demands of 300 million people with much greater purchasing power than today's population.

(2) *Consumption of most timber products has been rising rapidly.* In response to increases in population, economic activity, and income, the consumption of most industrial timber products has risen rapidly in recent decades. For example, between 1950 and 1978, softwood lumber consumption rose 25 percent. The volume of pulpwood consumption by U.S. mills increased nearly fourfold and hardwood plywood use rose by more than three times. Softwood plywood consumption showed the largest growth—about a sevenfold increase during the period.

In total, the consumption of industrial roundwood, i.e., the volume of the lumber, veneer and plywood, pulpwood, and other industrial products such as posts, poles, and pilings converted to a roundwood base, rose from close to 10 billion cubic feet in 1950 to nearly 13 billion in 1978. In contrast to the industrial products, the use of fuelwood declined from 1950 to the mid-1970's. However, since then, in response to the increasing costs of crude oil, coal and natural gas, use of fuelwood has been rising. This growth has been substantial in some regions of the country and particularly so in the Northeast.

(3) *Projections show demands for most timber products continuing to rise rapidly.* Projections, based on expected increases in population, economic activity and income, and a continuation of recent trends (1950–76) in stumpage and timber product prices, show that the demands for most timber products are likely to continue to grow rapidly in the decades ahead. However, as indicated in the following tabulation, there are differences in the amount of the increase.

These volumes are in standard units of measure, that is, board feet of lumber, square feet of plywood, and cords of pulpwood. In order to compare these projections of demand with pro-

Product	*Standard unit of measure*	*Consumption 1976*	*Projected demands—medium level 2000*	*2030*
Lumber	Billion board feet	42.7	59.9	67.3
Plywood	Billion square feet, 3/8-inch basis	20.6	30.1	34.1
Board (particleboard, insulating board, and hardboard)	Billion square feet, 1/8-inch basis	13.5	27.3	37.3
Pulpwood (U.S. mills)	Million cords	75.3	127.7	178.4
Other industrial products	Million cubic feet	379	800	900
Fuelwood (roundwood)	Million cords	8.1	18.7	30.7

[1] The course of events in the short run can also vary from that assumed. However, the variations which would be reasonably expected are not likely to have major impacts on most projections. For example, if the gross national product continued to rise in the 1977–90 period at the average rate of the last 5 years (2.8 percent), instead of the assumed rate of 3.7 percent, the demand for most timber products would be reduced—about 5 percent in the case of lumber and plywood. A reduction of this size would not be large enough to significantly alter the basic timber demand-supply outlook or the projected increases in timber prices.

jected timber supplies, they must be converted to a common unit of measure—cubic feet of roundwood and board feet of sawtimber. In making this conversion, it was assumed the yield of products—lumber, veneer and wood pulp—per unit of wood input would rise by an average of 10 percent over the projection period in response to technological improvements in manufacturing.

When all products are converted and added together, as in the tabulation below, the medium projection of demand, given recent price trends, reaches 22.7 billion cubic feet in 2000, with a continuing rise to 28.3 billion cubic feet in 2030, more than double the 13.3 billion cubic feet consumed in 1976.

Product	*1976*	*2000*	*2030*
	(Billion cubic feet, roundwood equivalent)		
Saw logs	6.5	9.2	9.8
Veneer logs	1.5	2.2	2.3
Pulpwood[2]	4.5	9.0	12.9
Other industrial products	.4	.8	.9
Fuelwood (roundwood)	.6	1.5	2.4
Total[3]	13.3	22.7	28.3

Much of the projected increase in demand is for pulp products; consequently, pulpwood accounts for about 45 percent of the total demand for roundwood in 2030, compared with a third in 1976.

Growth in roundwood consumption in the 1960's and 1970's consisted entirely of timber produced from softwood species. Consumption of hardwood roundwood has remained at about the same level since the late 1950's.

The projections show rather large increases for both softwoods and hardwoods. Assuming continuation of recent price trends, the medium projection of demand for softwoods is up 82 percent by 2030—from 10.3 in 1976 to 18.7 billion cubic feet. Demand for hardwoods is projected to more than triple, rising from 3.0 to 9.6 billion cubic feet. The faster rate of growth for hardwoods largely reflects the projected rise in demand for hardwood roundwood for pulpwood and fuelwood, hardwood lumber for pallets and railroad ties, and hardwood plywood and veneer for furniture manufacture.

Trends in consumption of sawtimber have been similar to the trends for roundwood. The projections show continuation of this similarity. By 2030, projected medium demands with base level price trends total about 78.6 billion board feet for softwoods and 30.9 billion board feet for hardwoods.

(4) *Some increase in net imports of timber products is projected, but the increase is relatively small in comparison to the projected growth in demand.* Part of the projected increases in demand will be supplied by imports. Between 1950 and 1977, the roundwood equivalent of the imports of timber products — chiefly softwood lumber, wood pulp, newsprint, and hardwood plywood and veneer—increased from 1.5 to 3.2 billion cubic feet. The softwood forests of Canada and tropical hardwood forests—the sources of nearly all imports—can support larger timber harvests. In view of this and the anticipated growth in demand, imports are expected to continue to rise until about 2010 when they level off at 4.5 billion cubic feet.

Exports of timber products, chiefly pulpwood products and softwood logs, have also been rising, moving up from 0.1 billion cubic feet in 1950 to 1.5 billion cubic feet in 1977. In contrast to imports, the total volume of exports is not expected to change significantly although there are likely to be divergent trends among the major products. Softwood log and lumber exports, for example, are expected to stay close to present levels until about 1990, then begin to decline as the supplies of high-quality, old-growth timber on the Pacific Coast fall off. Exports of wood pulp, paper, and board continue to rise through the projection period.

Given the above projections, there is a substantial increase in net imports into the United States from 1.7 billion cubic feet in 1977 to 3.2 billion in 2030. This growth in net imports can meet part of the projected increases in demand for timber products. In total, however, the increase in volume is small in comparison to the growth in demand for roundwood.

(5) *Most of the projected growth in demand for timber will fall on domestic forests.* After allowances for improvements in utilization and increases in net imports, projected demands for timber from domestic forests rise from 12.1 billion cubic feet in 1976 to 25.1 billion cubic feet by 2030—an increase of 107 percent. Associated demands for sawtimber rise from 60.7 to 102.5 billion board feet.

In volume terms, the projected rise in demand on domestic forests between 1976 and 2030 is the same for softwood and hardwood roundwood, some 6.5 billion cubic feet. In percentage terms, however, the projected increases are much larger for hardwoods. For example, demands on domestic forests for hardwood roundwood rise some 224 percent between 1976 and 2030, compared to 71 percent for softwoods. Projected demands for hardwood and softwood sawtimber show roughly similar trends.

(6) *There is a large domestic timber resource—mostly in private ownership.* The United States has a very large domestic timber resource. About 737 million acres, 33 percent of the country's land area, is forest land. Nearly two-thirds of this, or 483 million acres, is classified as commercial timberland, that is, land capable of producing at least 20 cubic feet of industrial wood per acre per year and not reserved for uses that are not compatible with timber production.

Farmer and other private ownerships—a diverse group that includes people from a cross section of the population and firms other than those in the forest industries—contain 278 million acres, some 58 percent of the commercial timberland. Another 69 million acres, 14 percent of the total, is owned by forest industries. The remaining area, some 136 million acres, or 28 percent of the total, is in public ownership. The largest part of this, 89 million acres, is in National Forests.

The commercial timberlands contained some 792 billion cubic feet of roundwood in 1977. About 64 percent of the total volume was in sawtimber trees (trees large enough to contain at least one log suitable for the manufacture of lumber). Another 26 percent was in poletimber trees (trees from 5 inches in diameter at breast height to sawtimber size and now or prospectively suitable for industrial timber products). The remaining 10 percent of all roundwood volume was in rough, rotten and salvable dead trees. Some of this latter material may be suitable for lumber and veneer, but most of it is usable only for pulp, fuel, and other products where log quality requirements are flexible.

Softwoods predominate in the Nation's timber inventory. In 1977, there was a total of 456 billion cubic feet of softwood growing stock including 1,985 billion board feet of sawtimber. The largest portion of the softwood timber inventory in 1977 was in National Forests, including some 46 percent of all softwood growing stock and more than half of the softwood sawtimber. Most of this timber was in old-growth stands in the Western United States.

[2]Includes pulpwood and pulpwood equivalent of the net imports of pulp, paper, and board.
[3]Includes imported logs not shown by major product use.

Some 27 percent of the softwood growing stock and 22 percent of the sawtimber was in farmer and other private ownerships. Most of this volume was in the East. Another 16 percent of the softwood growing stock and sawtimber volumes was in forest industry ownership, over half of this was in the West.

Hardwood growing stock inventories in 1977 totaled 255 billion cubic feet including 594 billion board feet of sawtimber. About 70 percent of these inventories was in farmer and other private ownerships and 13 percent on forest industry ownerships. The bulk of the hardwood timber in these ownerships was in the East—it was roughly equally divided between the North and South.

(7) *Trends in inventories, net annual growth, and harvests indicate the domestic timber situation has been improving in most regions.* By most measures, the domestic timber resource situation has been improving and in a substantial way. For example, between 1952 and 1977, softwood growing stock inventories increased 7 percent and hardwoods 43 percent. Sawtimber inventories followed similar trends. The increase in inventories has been almost entirely on the young stands in the North and South and chiefly on the farmer and other private ownerships. Softwood inventories on the forest industry ownerships and the National Forests in the Pacific Coast section dropped substantially, a natural and expected result of the harvesting of old growth stands. Timber inventories in the Rocky Mountains, where harvests are at a relatively low level, have not changed much since 1952.

The increases in inventories reflect net annual timber growth-removal balances. Since 1952, net annual growth of softwoods in the eastern sections of the United States has been considerably higher than removals, i.e., harvest of roundwood products plus logging residues and loss of timber inventory from changes in land use and clearing. In 1976, net annual growth of eastern softwood growing stock exceeded removals by 2.6 billion cubic feet, or 50 percent. Sawtimber growth was 7 billion board feet or 33 percent above removals. Most of the excess of net annual growth over removals was on the farmer and other private ownerships.

For the western United States, removals of softwood growing stock in 1976 exceeded net annual growth by 0.3 billion cubic feet, or 7 percent. Removals of softwood sawtimber were nearly 30 billion board feet, over 8 billion board feet more than net annual growth. Most of the excess of removals over growth was on the forest industry and National Forest ownerships in the Pacific Coast section.

Net annual growth of eastern hardwoods in 1976 substantially exceeded removals, particularly in the North. For the entire East, net annual growth of hardwood growing stock was 8.7 billion cubic feet—116 percent above removals. Net growth of hardwood sawtimber was 22.9 billion board feet, 66 percent more than removals. The greatest part of the surplus—growing stock and sawtimber—was in farmer and other private ownerships.

(8) *The domestic timber resource in most regions can support larger timber harvests.* The current growth-removal balances show that the hardwood forests and eastern softwood forests can now support additional timber harvests. These balances will, of course, change, and future supplies, particularly those in the last decades of the projection period, can vary over a wide range. However, assuming that commercial timberland owners continue to respond to price and inventory changes and manage their timber stands much as they have in the recent past, timber harvests can be increased substantially in most regions during the next few decades.

In total, projected softwood roundwood supplies (the volume of timber that would be harvested given the specified assumptions) rise from 9.5 billion cubic feet in 1976 to 12.3 billion cubic feet in 2030, an increase of 29 percent. The projected change in softwood sawtimber supplies over the same period is from 50.0 to 55.6 billion board feet, a rise of 11 percent.

There are important differences in the outlook among the major softwood timber producing regions. The projected softwood sawtimber supplies in the Pacific Coast section drop from 25.2 billion board feet in 1976 to 19.6 billion board feet in 2030, with much of the decline occurring by 1990. The major cause of the decline in the Pacific Coast is the physical incapacity of the forest industry lands to maintain current cutting levels. The old-growth inventory in this ownership class is being liquidated and harvests from second-growth stands cannot offset the decline in supplies from old-growth stands for at least several decades.

In contrast to the Pacific Coast, softwood sawtimber supplies in the South are projected to increase from 18.0 to 27.3 billion board feet over the same period mostly on the farmer and other private ownerships. There are also increases in the North and Rocky Mountains but on a much smaller scale.

Changes in timber supplies of magnitudes in prospect in the Pacific Coast and South are certain to have major and longlasting impacts on the economies of the two sections. From the standpoint of the Pacific Coast, it will mean closed mills and reduced timber-based employment and income. The impacts are likely to be particularly severe in rural areas where timber is the chief source of economic activity. In the South, on the other hand, it suggests new timber-based economic activity and associated gains in employment and income.

Hardwood roundwood supplies are projected to rise 2.7 times between 1976 and 2030, from 3.3 to 8.9 billion cubic feet. Sawtimber supplies more than double, moving up from 12.9 to 27.5 billion board feet. Although less pronounced than the projected geographic shifts in softwood supplies, an increased share of hardwood timber supplies is also projected to come from the South.

(9) *Projected timber demands on domestic forests are rising faster than supplies—rising prices and economic scarcity are in prospect.* Comparisons of the projected increases in timber demands and supplies presented above indicate that the demands are rising faster than the supplies.

The projected imbalances are largest for softwood timber. Projected demands on domestic forests for softwoods rise from an actual consumption of 9.2 billion cubic feet in 1976 to 13.8 billion by 2000 and 15.7 billion by 2030. Projected supplies of softwood roundwood from domestic forests show moderate increases from 9.2 bllion cubic feet in 1976 to 11.1 billion in 2000 and 12.3 billion by 2030. The outlook for softwood sawtimber is similar—large increases in demand under the given assumptions and modest increases in supplies.

It is evident from these comparisons that a substantial rise in the relative prices of softwood stumpage and most softwood timber products beyond the levels assumed in preparing the base level projections discussed above will be necessary to balance demands and supplies in future decades.

Projections of indexes of regional equilibrium softwood stumpage prices, the prices necessary to bring about an equilibrium between the projections of timber demands and supplies, show softwood stumpage prices rising substantially in all regions. In the southern regions, stumpage prices measured in 1967 dollars and net of inflation or

deflation, rise at an annual rate of 2.5 percent per year between 1976 and 2030. This is above the rate of increase in the Douglas-fir region of the Pacific Northwest (1.8 percent) and that in the northern regions (1.9 percent). It is, however, below those in the other regions and especially in the Rocky Mountain section where projected stumpage prices rise at an average rate of 3.8 percent per year.

In general, the demand-supply projections for hardwood—both roundwood and sawtimber—show a more favorable supply outlook than is the case for softwoods. It appears that supplies will be adequate in the next two or three decades to meet demands for most hardwood products. As a result, there may not be much increase in average hardwood stumpage prices in the years immediately ahead. Beyond the next few decades, however, base level demands begin to rise above base level supplies. As this occurs, stumpage prices will move upward, especially in the South Central region, where the competition for the available supplies is likely to be the most intense.

This outlook will be changed if there is an increase in demand for fuelwood or any other hardwood product much above the projected levels. Such an increase would likely fall mostly on the hardwood resource in the North. A relatively small increase could significantly alter the demand-supply balances in the northern regions and result in rising prices in the years immediately ahead. A large increase in demand would, of course, greatly intensify the competition for hardwood timber and cause rapid increases in prices.

The immediate outlook for larger sized hardwood sawtimber of preferred species, such as select white and red oak, walnut, and black cherry, is quite different from that for the smaller sized, lower quality material. Removals of such timber have been close to or above net annual growth in recent decades, and continuing and large increases in stumpage prices have apparently reflected this situation. These trends seem likely to continue.

Increases in stumpage prices will be reflected in prices of timber products. For example, softwood lumber and plywood prices measured in 1967 dollars increase at an annual rate of 1.0 and 1.4 percent, respectively. The increases average about 0.2 percent per year for hardwood lumber and 0.7 percent for hardwood plywood. The projected increases in lumber prices are consistent with historical trends.

Equilibrium price increases for paper and board are likely to be lower than those for lumber, as in the past. For example, in contrast to the projected 143 percent increase for softwood lumber between 1976 and 2030, relative prices of paper and board rise by only about a third.

In view of the many uncertainties involved in projecting both demands and supplies, the above estimates of prices at which demands and supplies might be balanced must be regarded as general approximations that would only be realized under the assumed conditions underlying these specific projections.

Despite all uncertainties, it does seem reasonably certain that the Nation is faced with the prospect of continuing and substantial increases in relative stumpage prices for most species and sizes of timber and for most timber products. The increases are likely to be largest for softwood sawtimber, the higher quality hardwood timber of preferred species, and the products—chiefly lumber and plywood—made from this timber. The outlook is consistent with the trends that have prevailed during most of the twentieth century. It reflects growing economic scarcity of a basic raw material.

(10) *A growing economic scarcity of timber will have significant and adverse effects on the economy, the environment, and general social well-being.* A growing economic scarcity of timber, and the associated increases in relative stumpage and timber product prices, will have significant adverse effects on primary timber processing industries, timber inventories, consumers of wood products, and the environment. In a free competitive economy, such as that operating in the timber sector, as demands for timber begin to rise faster than supplies, prices increase to the extent necessary to maintain an equilibrium between demands and supplies. Further, as prices move up, demands are reduced and supplies (also timber removals) are increased from the levels that would have existed without the price increases.

The reduction in demand will have important implications for the primary timber processing industries and particularly for the lumber industry. By 2030, for example, the demand for lumber, given rising relative prices, will be some 11 billion board feet below the level that would have existed without the increase in prices. This is a measure of market loss for the lumber industry.

The increase in supplies resulting from rising prices will be reflected in a corresponding increase in timber removals. This will, in turn, have some significant effects on net annual growth and inventories. The largest impacts are in the South. By the end of the projection period, net annual growth of softwood growing stock in that section, given the higher levels of timber removals associated with equilibrium prices, would be only 75 percent of the base level projections. Softwood roundwood inventories drop even more rapidly and by 2030, amount to only a little over half of the base level projections discussed above. Inventories on the Pacific Coast are also substantially below the base level projections.

Declines in inventories of the sizes projected mean that maintaining equilibrium levels of harvest beyond the next few decades would require investments in various management programs much larger than those implicit in the base level projections. It also suggests that without a large expansion in management programs, the recent and prospective growth in the timber processing industries in the South will be a temporary thing, lasting only a few decades and followed by a sharp decline.

Although there are substantive adverse impacts on the timber processing industries, consumers of wood products would suffer the greatest losses from rising relative prices of timber products. Housing will be especially affected. The projected increase in softwood lumber prices would by 2030 result in a 7-percent reduction in the output of dwelling units. In total, it is estimated that consumers in 2030 will pay some $7 billion more for wood products and competing materials because of the lack of enough softwood timber to maintain prices of softwood lumber and plywood at the 1977 level.

There are also likely to be widespread and significant effects on employment. It is estimated, for example, that timber industry employment in 2030 would be some 90,000 person-years below the levels that would have existed if softwood timber supplies were large enough to meet demands. Impacts on total economy-wide employment would be much larger because of impacts on the trade, service, and other industries. Such impacts are especially critical because of the high rates of unemployment frequently found in communities in forested areas.

The effects of rising relative stumpage and timber product prices on nonrenewable resources and the environment are also substantial. As prices rise, and more steel, aluminum, and plastics are substituted for timber products, there will be an acceleration in

the rate of use of nonrenewable resources, and particularly fuel and metal minerals. There will also be rising environmental costs, chiefly from higher emissions of air and water pollutants resulting from the mining, industrial processing, and power generation associated with the greater use of substitute materials.

(11) *The adverse impacts which will result from a growing economic scarcity of timber are not inevitable—there are large opportunities to increase and extended timber supplies.* The adverse impacts associated with economic scarcity and rising relative prices of stumpage and timber products are not inevitable. There are large opportunities to increase and extend timber supplies. In 1976, average net annual timber growth per acre on all ownerships was only about three-fifths of that attainable in fully stocked natural stands. With the use of genetically improved trees, fertilization, spacing control, and other intensive management measures, much greater growth can be achieved, so much that no one really knows the biological limits.

With expected changes in management costs and stumpage prices, only part of the biological opportunities can be expected to yield an acceptable rate of return on the investments required to put them into practice. However, the economic opportunities to increase timber growth—those that would yield 4 percent or more on the investment, measured in constant dollars—are large and, if carried out, would in time increase timber supplies in a major way.

A study of these economic opportunities shows that the potential exists for intensifying management on 168 million acres of commercial timberland—some 35 percent of the Nation's total. With treatment of these acres, net annual timber growth could be increased by 12.9 billion cubic feet, a volume roughly equal to total timber harvests in 1976 and to three-fifths of the total net annual growth.

On an area basis, nearly three-quarters of the economic opportunities to increase timber growth involve regeneration of nonstocked acres, harvesting mature stands and regenerating the harvested tracts, and converting existing stands to more desired species. A majority of the economic opportunities, 74 percent, is on farmer and other private ownerships which collectively contain about 58 percent of the commercial timberland. Most of the remainder is on the 14 percent of the commercial timberland in forest industry ownership. All economic opportunities on the National Forests are currently scheduled or planned and are not included.

The economic opportunities for increasing timber growth are concentrated in the southern regions—53 million acres in the Southeast and 64 million acres in the South Central. There are also substantial areas in the North—35 million acres—and the Pacific Coast—16 million acres.

In addition to the opportunities for increasing timber supplies through management intensification, there are substantial opportunities for extending supplies through improved utilization. These include increased use of forest and urban residues, additions to timber harvest from rough and rotten trees, dead trees, and trees on noncommercial forest land; and expanded product supply through more efficient processing techniques.

In 1976, there was about 1.4 billion cubic feet of residues from growing stock left unutilized on logging areas. Perhaps two to four times as much volume was left in residual tops and branches, rough and rotten trees, small stems, and other unused material on harvest sites. There are also large volumes of salvable dead timber and rough and rotten trees—in total some 81 billion cubic feet—that is potentially useable. Urban wood wastes, currently estimated at about 45 million tons annually, are another potential source of wood fiber.

Technology for manufacturing panel products—such as particleboard, medium-density fiberboard, and composite veneer-particle panels—offers large possibilities for using nearly all kinds of wood residues. Techniques for reducing the amount of phenolic resin required per ton of product or for making lower cost adhesives would further enhance the potential for using these materials.

In the pulp and paper industry, there are many opportunities for expanding the resource base and for increasing product yields. Continued development of techniques for harvesting and pulping whole-tree chips could greatly increase per-acre fiber recovery and reduce logging residue problems. Improvements in papermaking techniques would allow more use of pulp from high-yield processes, hardwoods, and additional recycling of waste paper and paperboard.

Improved lumber and plywood processing technology can extend timber supplies substantially. Particularly important is the need for cost-effective systems of manufacturing lumber and plywood from small-diameter logs and short logs. Promising approaches include high-speed electronic scanning and automated control systems, automated stress grading systems and gluing techniques to produce wide-width or long-length products equivalent to lumber sawn from large logs.

Quality control in sawmilling, lumber drying, and remanufacturing offers immediate opportunities for increased product supply. For example, studies have shown that many sawmills can improve yield by as much as 10 percent through increased attention to equipment maintenance and machine settings.

Beyond the opportunities to increase and extend timber supplies, there is another set of opportunities—those that will reduce demand for timber through (1) improving design of structures and manufactured products; and (2) increasing the service life of wood structures and products by better upkeep and improvements or by treatment with chemicals to increase resistance to decay, fire, insects or dimensional change.

(12) *Moving forward to meet projected demands for timber products would require substantial investments, but these investments promise to be profitable.* Increasing and extending supplies of timber products is technically and economically feasible and can be done while maintaining the forest environment. However, substantive increases in demands for timber products will require large public and private investments in a variety of management, research, and assistance programs.

Various studies have shown that most farmer and other private owners, who collectively control most of the Nation's commercial timberlands, have diverse objectives, widely different characteristics and attitudes, a limited knowledge of existing management opportunities, and varying willingness and capacity to make investments which will increase supplies of timber.

These problems have long been recognized as major impediments to increasing timber supplies on the farmer and other private ownerships. But what has not been adequately recognized is that many of the benefits of the investments in increasing timber supplies accrue to the society generally in the form of lower prices for stumpage and timber products. Lower prices reduce the cost to consumers of goods such as houses and furniture, the environmental pollution associated with use of substitute materials, such as steel and plas-

tics, dependence on foreign sources of supply, and the rate of use of non-renewable resources.

These broad economic, social, and environmental benefits, and the likelihood that even direct benefits such as income from timber sales will not accrue to many current owners because of short tenures of life expectancy, suggest two things. First, there is a strong justification for publicly supported cost sharing and technical assistance programs. Second, existing economic opportunities for management intensification on most private ownerships are not likely to be realized in any substantive way without such programs.

Much can be done to increase and extend supplies of timber products by better use of existing technology and by further research to develop new technology. Investments in management practices and facilities could also be made more efficient by expanding research.

Inevitably, in expanding programs to increase supplies of timber products, the point will be reached where increasing outputs will constrain or reduce the outputs of other products. Research is perhaps the best hope of developing ways of integrating and balancing multiple uses of forest resources and reducing the conflicts which are likely to result from rapidly expanding demands.

Finally, there is the need to further explore the economic, social, and environmental implications of a future in which the demands for nearly all forest products are increasing more rapidly than supplies. This is a basic need—it is the societal basis for changing policies and programs. The results of this research are likely to have profound impacts on the future management and use of the Nation's forest resources.

It has not been feasible in this study to evaluate in aggregative ways the costs and benefits associated with moving forward to meet demands for timber products. However, the partial analyses that have been made indicate that when the economic, social, and environmental benefits are considered, the investments are likely to be profitable from the standpoint of the society and the economy. For example, by the end of the projection period, the savings in consumer costs in just 2 years would provide enough capital to implement nearly all of the economic opportunities to increase timber supplies. Implementation of these opportunities would, in turn, increase timber supplies enough to meet projected demands and at the same time permit a reduction in imports of timber products or an expansion in exports.

Chapter 1
Economic Importance of Timber in the United States

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Forest lands provide many things —water, forage, habitat for wildlife, sites for outdoor recreation—which add to the social, cultural, and economic aspects of life for most people. Because of their large area and wide geographic dispersion, they are also important in maintaining the natural environment. But, by some measures most important of all, they are the source of timber, one of the Nation's basic raw materials. In one form or another—as housing, furniture, containers, writing paper, books and newspapers, fuel, and hundreds of other items—products made from trees affect the quality of life for everyone, including those who may never have the opportunity to enjoy the natural beauty of a forest or participate in forest-based outdoor recreation.

There are various ways of measuring the importance of timber to the Nation and its economy and many of these are discussed in the following chapters of this study. In a summary or aggregative sense, however, this can best be measured by the importance of timber products as an industrial raw material and the amount of gross national product and employment originating in timber-based economic activities.

Table 1.1—*Industrial raw materials consumed in the United States, by broad materials group, specified years 1920–77*

Year	All industrial raw material	Industrial timber products[1]		Nonwood materials: Minerals except fuels[2]		Nonwood materials: Agricultural and fishery nonfoods and wildlife products[3]	
	Billion 1972 dollars	*Billion 1972 dollars*	*Percent of total*	*Billion 1972 dollars*	*Percent of total*	*Billion 1972 dollars*	*Percent of total*
1920	11.30	4.56	40.4	2.50	22.1	4.24	37.5
1925	12.07	4.88	40.4	3.12	25.9	4.07	33.7
1930	10.44	3.73	35.7	2.71	26.0	4.00	38.3
1935	9.20	2.98	32.4	1.86	20.3	4.35	47.3
1940	12.54	3.99	31.8	3.50	27.9	5.05	40.3
1945	13.99	3.82	27.3	4.75	34.0	5.42	38.7
1950	17.12	5.09	29.7	6.29	36.8	5.74	33.5
1955	18.13	5.27	29.1	7.42	40.9	5.43	30.0
1960	17.67	4.99	28.2	7.53	42.6	5.15	29.2
1965	21.50	5.81	27.0	10.47	48.7	5.22	24.3
1970	21.25	5.65	26.6	11.00	51.8	4.60	21.6
1971	21.95	5.99	27.3	11.36	51.7	4.61	21.0
1972	22.86	6.19	27.1	12.24	53.5	4.43	19.4
1973	23.90	6.23	26.1	13.20	55.2	4.47	18.7
1974	22.57	5.64	25.0	12.90	57.2	4.02	17.8
1975	19.76	5.08	25.7	10.56	53.5	4.11	20.8
1976	22.27	5.79	26.0	12.16	54.6	4.32	19.4
1977	23.05	6.18	26.8	12.64	54.8	4.23	18.4

[1]Includes saw logs, veneer logs, pulpwood, and miscellaneous products, such as poles, piling, and posts.
[2]Includes mineral construction materials, such as dimension stone, crushed and broken stone, sand and gravel, fire clay, common clay and shale, gypsum, and other similar construction materials; metal ores; chemical and fertilizer minerals; abrasives and other minerals.
[3]Includes cotton and other fibers, oils, rubber, furs, hides, and other similar products.

Source: U.S. Department of Commerce, Bureau of the Census; U.S. Department of the Interior, Bureau of the Mines; and the University of Connecticut. *Raw materials in the United States economy: 1900–1977*. Tech. Pap. 47. 1980.

Timber Products as an Industrial Raw Material

In the early days of the Nation, timber was the most important industrial raw material, widely used in all types of construction and manufacturing, ranging from houses, bridges, and even road surfaces to the wagons and ships which provided the chief means of transportation. Gradually over the years, as the technology and capacity to produce and use other raw materials (and especially minerals) developed, the relative importance of industrial timber products declined. This continued until around the mid-1940's. Since then, as illustrated in Table 1.1 and figure 1.1, the position of industrial timber products has stabilized and they have composed a little over a quarter of all the industrial raw materials consumed in the country.

Historically, timber was not only an important source of industrial raw material, it was the chief source of industrial and domestic fuel. This too gradually changed as the technology and capacity to produce and use other fuels developed, and timber use for fuel declined until by the mid-1970's wood probably accounted for less than 1 percent of the energy materials consumed. Starting then, as the real costs of other energy materials began to rise, the historical downward trend stopped. At this time, it appears that wood will supply an increasing, although small, part of the Nation's total energy needs.

Gross National Product and Employment Originating in Timber-Based Economic Activity

Given the importance of timber as a raw material, it follows that a significant part of the Nation's gross national product and employment originates in timber based economic activity. There have been two studies[1] "The Economic Importance of Timber in the United States" and "Timber in the United States Economy 1963, 1967, and 1972," which have dealt in some depth with quantitative measures of such contributions.

The latter study shows that the sum of the values added in all types of timber-based economic activities—timber management, timber harvesting, primary and secondary manufacture of timber products, construction, transportation and marketing—amounted to about $48.5 billion in 1972[2] (table

[1] U.S. Department of Agriculture, Forest Service. The economic importance of timber in the United States. Misc. Pub. 941. Govt. Printing Off., Washington, D.C., 91 p. 1963. Timber in the United States economy 1963, 1967, and 1972. Gen. Tech. Rep. WO-21, Govt. Printing Off., Washington, D.C., 90 p. 1980.

[2] Value added in any given activity or industry is a measure of the contribution of that activity or industry to the gross national product.

Figure 1.1

Relative Importance of Industrial Raw Materials, 1920 –77

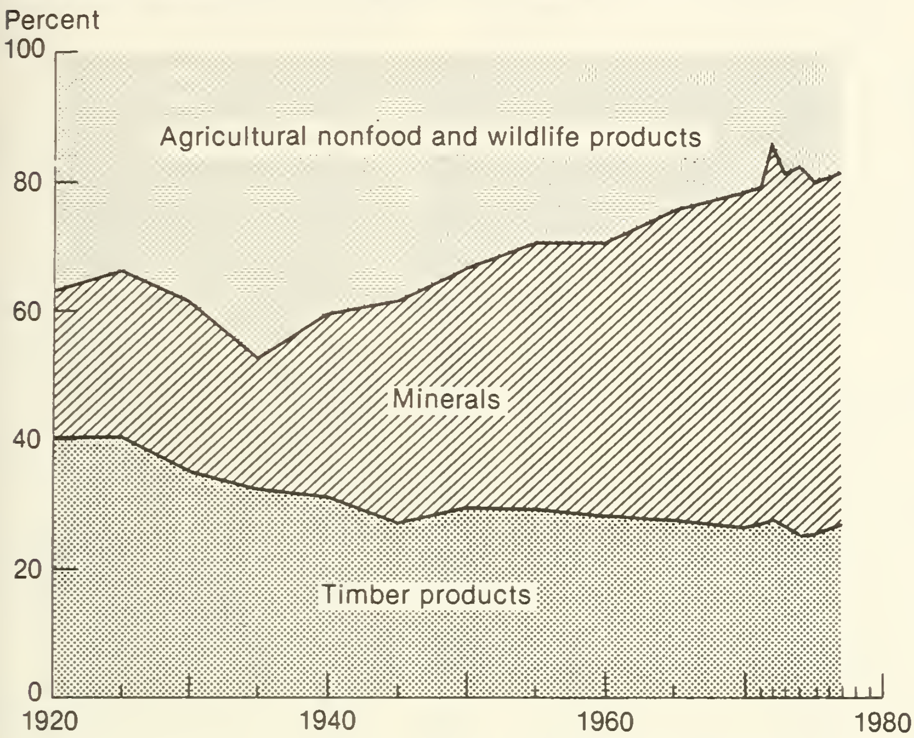
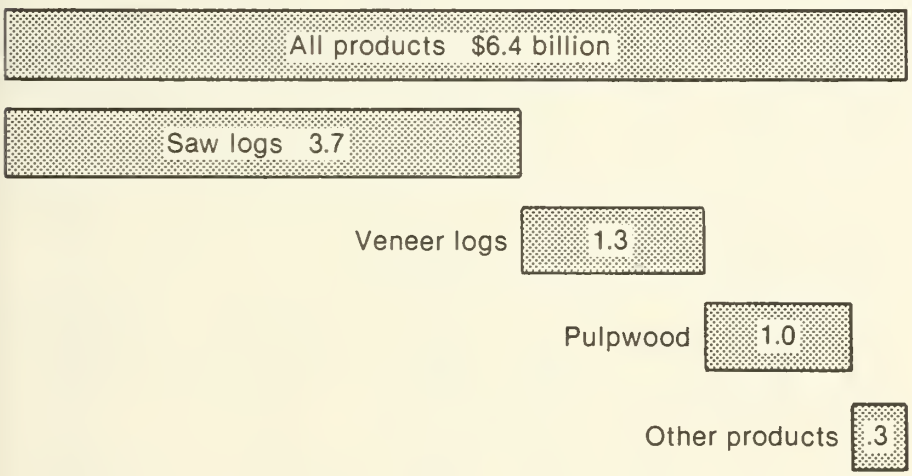


Figure 1.2

Value of Roundwood Harvested, 1972



1.2). This represented 4.1 percent of the Nation's gross national product—the market value of all goods and services produced. This means that about $1 of every $24 of gross national product originated in some type of timber-based economic activity.

Of the total value added to the gross national product attributable to timber in 1972, about 6 percent or $2.9 billion originated in timber management. This represents the value of the standing trees (stumpage) harvested in that year and is a measure of timber income to forest owners.

The value of the roundwood—saw logs, veneer logs, pulpwood, etc.—harvested, along with that of related products, such as Christmas trees and pine gum, amounted to $6.4 billion in 1972. Over 98 percent of this total was for sawlogs, veneer logs, pulpwood, and other solid roundwood products as illustrated in table 1.3 and figure 1.2; sawlogs accounted for about 58 percent of the roundwood value, veneer logs 21 percent, and pulpwood 16 percent. The remaining 5 percent, or $0.3 billion, included a wide assortment of products such as poles, piling, fence posts, mine timbers, cooperage logs, and shingle bolts.

In value terms, timber ranks as one of the Nation's most important agricultural crops. The total value of the products harvested in 1972 equaled about 17 percent of the value of all farm crops in that year, was more than double the value of the wheat produced, and was somewhat greater than the value of the soybeans produced. Corn was the only farm corp which substantially exceeded timber in terms of total value.

The value of shipments from primary timber manufacturing industries (sawmills and planing mills; veneer and plywood plants; pulp, paper and paperboard mills; and other primary manufacturing plants such as cooperage-stock mills and particleboard plants) amounted to $23 billion in 1972. Shipments from selected secondary timber manufacturing industries (paper and paperboard products, furniture, millwork and prefabricated wood products, and wooden containers industries) totaled $35.5 billion.

Only part of the value of the products harvested and the value of shipments from the timber harvesting sector and the primary and secondary manufacturing industries represents a net contribution to the gross national product from economic activities based on timber. In the harvesting sector, this value added attributable to timber amounted to $3.1 billion in 1972, about half of the total value of the products harvested.

In the primary manufacturing industries, the value added attributable to timber in 1972 was $8.8 billion. Of this, about 52 percent originated in pulp, paper, and paperboard mills; 33 percent in sawmills and planing mills; 12 percent in veneer and plywood plants; and 3 percent in other primary manufacturing enterprises.

In the secondary manufacturing industries, the value added attributable to timber totaled $12.5 billion. About two-fifths of this originated in the paper and paperboard products industry. Another one-fifth originated in the fi-

Table 1.2—*Value of product or service, value added and employment, and value added and employment attributed to timber in timber-based economic activities in the United States, 1972*

Economic activity	Value of product or service[1]	Value added		Employment	
		Total	Attributed to timber	Total	Attributed to timber
	Million dollars	*Million dollars*	*Million dollars*	*Thousand employees*	*Thousand employees*
Timber management	2,864	2,864	2,864	117	117
Harvesting	6,360	3,065	3,065	190	190
Primary manufacturing					
Sawmills and planning mills	7,575	3,029	2,876	184	171
Veneer and plywood plants	2,923	1,238	1,073	66	58
Pulp, paper, and paperboard mills	11,705	5,417	4,583	218	184
All other	815	384	264	20	14
Total	23,018	10,068	8,797	488	427
Secondary manufacturing					
Millwork and prefabricated wood products	8,085	3,127	1,951	219	137
Wooden containers	774	359	324	37	33
Furniture	10,111	5,395	1,820	423	151
Paper and paperboard products	16,553	7,605	5,063	413	278
Fibers, plastics, and textiles	....	17,513	2,629	1,652	249
All others	....	....	718	....	52
Total	....	....	12,504	....	900
Construction	159,000	79,601	11,947	5,278	795
Transportation and marketing					
Transportation	....	32,070	2,729	1,899	165
Wholesale trade	684,300	70,466	2,997	4,310	181
Retail trade	470,800	91,635	3,561	12,498	489
Total	....	194,171	9,287	18,707	835
All types	....	....	48,464	....	3,265

[1]Value of product or service: Timber management—value of stumpage cut; harvesting—value of timber products harvested; primary and secondary manufacturing industries—value of shipments; construction—total construction value, including new and estimated maintenance and repair; and wholesale and retail trade—total sales.

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Agriculture, Forest Service. *Timber in the United States economy 1963, 1967, and 1972.* Gen. Tech. Rep. WO-21, 1980.

bers, plastics, and textiles industry. Of the remainder, 16 percent was in the millwork and prefabricated wood products industry, 15 percent in the furniture industry, 3 percent in the wooden containers industry, and 6 percent in all other secondary manufacturing.

Part of the value added in construction, transportation, and marketing is also attributable to timber. This amounted to an estimated $21.2 billion in 1972, about 44 percent of the total value added attributable to timber.

Employment attributed to timber in all timber-based activities amounted to 3.3 million (full-time-equivalent workers) in 1972 (table 1.2). This represents about 4 percent of total civilian employment in the United States and means that about 1 out of every 25 persons employed in 1972 was engaged in some type of timber-based economic activity.

Some 4 percent of the employment attributed to timber in 1972 was in timber management, and 6 percent in harvesting. Primary and secondary manufacturing accounted for 13 percent and 27 percent, respectively; construction for 24 percent, and transportation and marketing the remaining 26 percent.

Most of the employment in timber management, harvesting, and primary manufacturing was in forested rural areas. In many of these areas, other opportunities for employment are limited and the timber-based employment is the primary source of livelihood for the local people.

Table 1.3—*Value[1] of timber products harvested in the United States, by product, section, region, and State, 1972*

(Thousand dollars)

Section, region, and State	Total	Saw logs	Veneer logs	Pulpwood	Other products[2]
North					
New England					
Connecticut	3,250	1,850	(3)	(3)	1,250
Maine	99,400	35,450	4,250	56,250	3,450
Massachusetts	6,900	5,900	(3)	(3)	550
New Hampshire	19,300	13,900	(3)	4,100	1,050
Rhode Island	650	(3)	(3)	(3)	(3)
Vermont	15,450	8,800	800	2,900	2,950
Total	144,950	66,250	5,400	63,850	9,450
Middle Atlantic					
Delaware	3,900	1,300	1,050	1,100	(3)
Maryland	24,450	14,850	3,850	4,300	1,450
New Jersey	4,550	2,050	(3)	550	1,900
New York	39,200	21,200	1,400	8,400	8,200
Pennsylvania	59,500	32,500	1,350	13,050	12,600
West Virginia	36,100	27,850	650	2,850	4,750
Total	167,700	99,750	8,350	30,250	29,350
Lake States					
Michigan	81,850	33,700	1,900	26,500	19,750
Minnesota	52,900	10,900	(3)	27,700	13,850
North Dakota	(3)	(3)	(3)	(3)	(3)
South Dakota (east)	(4)	(4)	(4)	(4)	(4)
Wisconsin	76,350	24,700	2,750	26,400	22,500
Total	211,550	69,360	5,100	80,600	56,500
Central					
Illinois	17,800	12,800	900	950	3,150
Indiana	24,750	15,700	2,500	1,400	5,150
Iowa	9,500	4,800	1,250	500	2,900
Kansas	4,000	1,350	550	800	1,300
Kentucky	41,850	30,050	750	2,750	8,300
Missouri	33,800	20,050	750	900	12,100
Nebraska	2,900	2,150	(3)	(3)	(3)
Ohio	40,250	23,700	1,650	4,250	10,650
Total	174,850	110,600	8,700	11,650	43,900
Total North	699,050	345,950	27,550	186,350	139,200
South					
South Atlantic					
North Carolina	199,400	95,050	27,800	63,850	12,700
South Carolina	159,200	71,650	23,200	54,500	9,850
Virginia	116,900	57,600	15,800	34,750	8,750
Total	475,500	224,300	66,800	153,100	31,300
East Gulf					
Florida	104,450	22,350	13,050	66,400	2,650
Georgia	304,950	131,400	22,350	134,200	17,000
Total	409,400	153,750	35,400	200,600	19,650
Central Gulf					
Alabama	298,750	122,800	37,700	115,800	22,450
Mississippi	225,700	100,250	33,350	72,650	19,450
Tennessee	54,500	35,750	1,100	9,350	8,300
Total	578,950	258,800	72,150	197,800	50,200
West Gulf					
Arkansas	216,850	120,000	32,850	44,300	19,700
Louisiana	262,200	126,450	60,600	60,600	14,550
Oklahoma	25,150	13,900	3,600	5,950	1,700
Texas	178,300	83,200	43,550	45,800	5,750
Total	682,500	343,550	140,600	156,650	41,700
Total South	2,146,350	980,400	314,950	708,150	142,850
Pacific Coast					
Pacific Northwest					
Alaska	38,050	33,050	(3)	5,000	(3)
Oregon	1,435,700	764,300	626,700	29,700	15,000
Washington	940,650	687,000	179,750	45,150	28,750
Total	2,414,400	1,484,350	806,450	79,850	43,750

Table 1.3—*Value*[1] *of timber products harvested in the United States by product, section, region, and State, 1972—cont'd.*

(Thousand dollars)

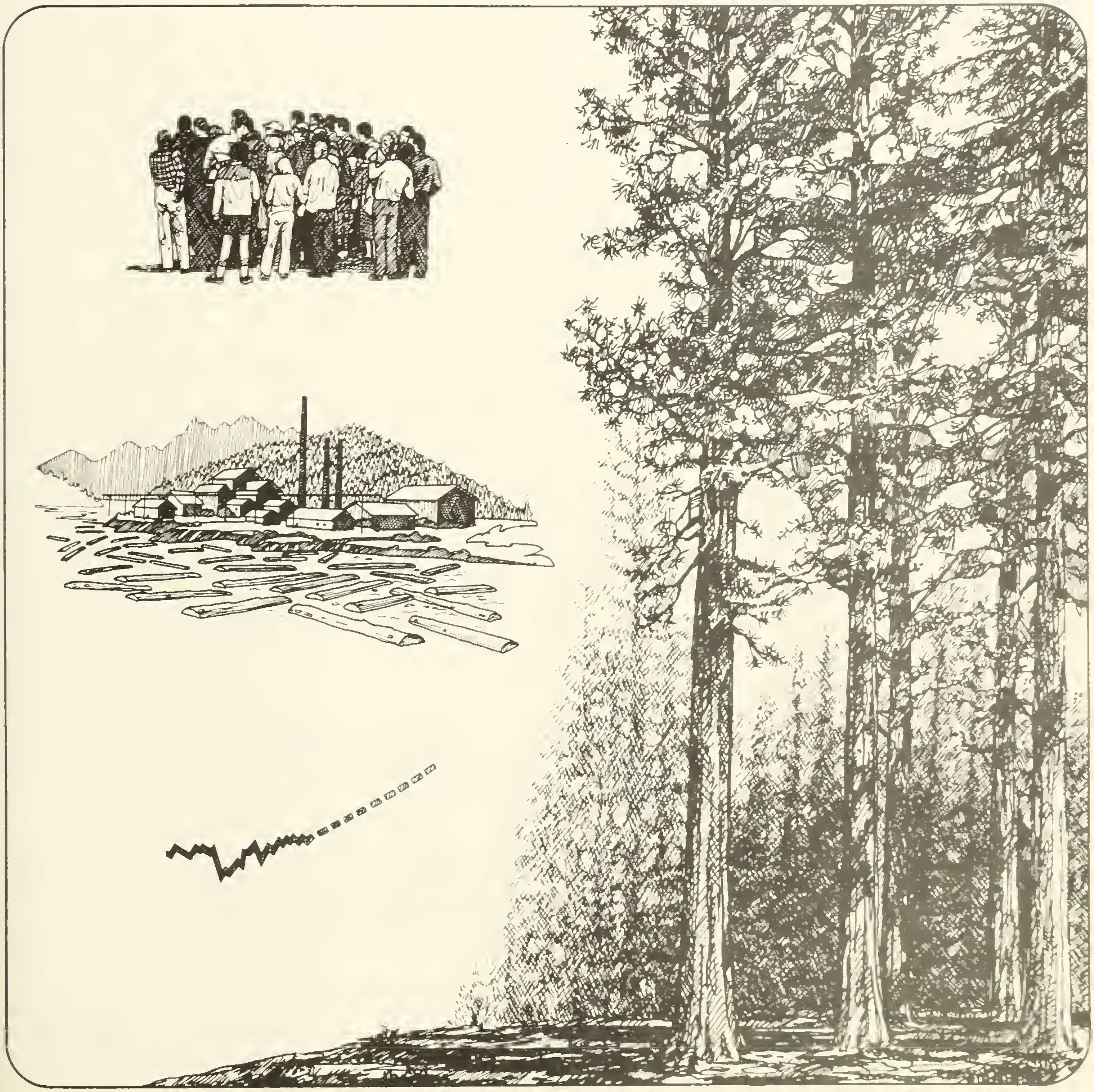
Section, region, and State	Total	Saw logs	Veneer logs	Pulpwood	Other products[2]
Pacific Southwest					
California	630,950	528,050	84,050	11,100	7,750
Hawaii	(3)	(3)	(3)	(3)	(3)
Total	631,200	528,050	84,250	11,100	7,800
Total Pacific Coast	3,045,600	2,012,400	890,700	90,950	51,550
Rocky Mountain					
Northern Rocky Mountain					
Idaho	184,900	143,450	35,500	3,050	2,900
Montana	171,700	137,250	29,750	2,700	2,000
South Dakota (west)[5]	4,250	2,550	(3)	950	750
Wyoming	21,200	16,500	4,250	(3)	(3)
Total	382,050	299,750	69,500	6,850	5,950
Southern Rocky Mountain					
Arizona	41,400	36,600	(3)	950	3,850
Colorado	16,300	14,650	(3)	(3)	1,600
Nevada	1,050	900	(3)	(3)	(3)
New Mexico	23,950	21,450	(3)	(3)	2,200
Utah	4,650	4,400	(3)	(3)	(3)
Total	87,350	78,000	(3)	1,350	8,000
Total Rocky Mountain	469,400	377,750	69,500	8,200	13,950
United States	6,360,400	3,716,500	1,302,700	993,650	347,550

[1]Value at local points of delivery such as a roadside, concentration yard, rail siding, barge landing, or local processing plant.
[2]Includes cooperage logs, poles, piling, fence posts, mine timbers, logs and bolts used for shingles and excelsior, and a variety of other products; Christmas trees; maple sap; and pine gum.
[3]Less than $500,000.
[4]Included in South Dakota (west).
[5]Includes South Dakota (east).

Note: Data may not add to totals because of rounding.

Source: See source note, table 1.2

Chapter 2
Basic Assumptions



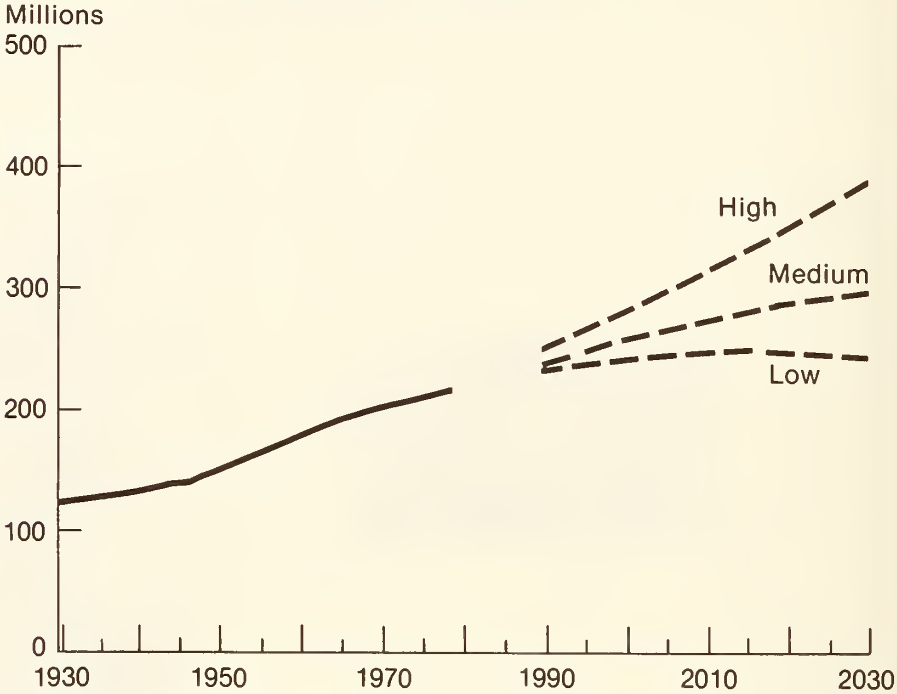
This chapter presents the general basic assumptions used in making the demand and supply projections presented in following chapters. In partial recognition of the uncertainty about future changes, three different assumptions are presented for population, economic activity, and income. These alternatives cover the range over which growth in these major determinants, and the associated projections of demand for timber products, could reasonably be expected to vary. They also illustrate the sensitivity of the projections to changes in these basic determinants.

In making the general assumptions used in this study, it is recognized that accurate predictions about longrun population and economic growth, or any of the other determinants of demand for or supply of timber products are beyond attainment. The intent is to make assumptions based on historical trends, current knowledge about developments which will affect these trends, and present expectations about future changes which can be generally accepted as reasonable at this time.

Historical trends in the major determinants used here are the result of massive social, political, technological, and institutional forces that are not easily or quickly changed. Barring major catastrophes such as a world war or depression, these forces once established are likely to persist over a considerable time. Thus, basic assumptions derived as described should provide a realistic basis for preparing an assessment for the development and guidance of timber policies and programs in the 1980's. Near the end of that decade, and as required by the Renewable Resources Planning Act, the basic assumptions will be reevaluated; and new expectations will be incorporated in the assessment of timber and other renewable resources which must be submitted to Congress in 1990.

Figure 2.1

Population, 1929-79, with Projections to 2030



Population

Changes in population have important effects on the demand for timber products included in this study. They also influence the size of the labor force, a major determinant of the level of economic activity and related materials usage.

In the five decades between the late 1920's and the late 1970's, the population of the United States increased by nearly 100 million people, rising at an average annual rate of 1.2 percent (table 2.1, fig. 2.1). The most recent projections of the Bureau of the Census[1] indicate that population is likely to continue to grow fairly rapidly through the projection period. The Census Series II projection—the medium projection of this study—shows population rising by another 80 million by 2030. In line with recent trends, however, the annual rate of growth declines from about 1 percent in the late 1960's and early 1970's to 0.3 percent in the decade 2020-2029.

The alternative projections (Series I—high and III—low) prepared by the Bureau of the Census also show substantial increases in population. However, under the low projection, nearly all of this occurs prior to 2010. Population growth in this projection period is very slow in the 2010–19 decade and begins to decline in the first half of the next decade.

The decline in the rate of population growth reflects Bureau of the Census assumptions about fertility rates.[2] Fertility rates fluctuated widely in recent decades, but since the late 1950's, have fallen sharply (fig. 2.2). The medium projection is based on an assumed fertility rate of 2.1—a level close to current birth expectations of young American wives.[3] The current

[1] U.S. Department of Commerce, Bureau of the Census. Population estimates and projections. "Projections of the population of the United States: 1977 to 2050." Cur. Pop. Rep. Ser. P-25, No. 704, Govt. Print. Off., Washington, D.C., 87 p. 1977.

[2] Fertility rates indicate the number of births per 1,000 women during their childbearing years. For a more detailed technical definition, see U.S. Department of Health, Education, and Welfare, Public Health Service. Natality statistics analysis of the United States, 1965–67. National Center for Health Statistics, Ser. 21, No. 19, Govt. Print. Off., Washington, D.C., 39 p. 1970.

[3] U.S. Department of Commerce, Bureau of the Census. Fertility of American women: June 1976. Cur. Pop. Rep., Ser. P-20, No. 308, Govt. Print. Off., Washington, D.C., 75 p. 1977.

Table 2.1—*Population, gross national product, and disposable personal income in the United States, specified years 1929–79, with projections to 2030*

Year	Population		Gross national product		Per capita gross national product		Disposable personal income		Per capita disposable personal income	
	Millions	*Annual rate of change*	*Billion 1972 dollars*	*Annual rate of change*	*1972 dollars*	*Annual rate of change*	*Billion 1972 dollars*	*Annual rate of change*	*1972 dollars*	*Annual rate of change*
1929	121.8	....	314.6	....	2,583	....	229.8	....	1,886	....
1933	125.7	0.8	222.1	−8.3	1,767	−9.1	169.7	−7.3	1,350	−8.0
1940	132.6	.8	343.3	6.4	2,589	5.6	244.3	5.3	1,849	4.6
1945	140.5	1.2	560.0	10.3	3,986	9.0	338.6	6.7	2,420	5.5
1950	152.3	1.6	533.5	−1.0	3,503	−2.6	361.9	1.3	2,386	− .3
1955	165.9	1.7	654.8	4.2	3,947	2.4	425.9	3.3	2,577	1.6
1960	180.7	1.7	736.8	2.4	4,077	.7	487.3	2.7	2,697	.9
1965	194.3	1.5	925.9	4.7	4,765	3.2	612.4	4.7	3,152	3.2
1970	204.9	1.1	1,075.3	3.0	5,248	1.9	741.6	3.9	3,619	2.8
1971	207.1	1.1	1,107.5	3.0	5,348	1.9	769.0	3.7	3,714	2.6
1972	208.8	.8	1,171.1	5.7	5,609	4.9	801.3	4.2	3,837	3.3
1973	210.4	.8	1,235.0	5.5	5,870	4.7	854.7	6.7	4,062	5.9
1974	211.9	.7	1,217.8	−1.4	5,747	−2.1	842.0	−1.5	3,973	−2.2
1975	213.6	.8	1,202.3	−1.3	5,629	−2.1	859.7	2.1	4,025	1.3
1976	215.2	.7	1,273.0	5.9	5,915	5.1	891.8	3.7	4,144	3.0
1977	216.9	.8	1,340.5	5.3	6,180	4.5	929.5	4.2	4,285	3.4
1978	218.7	.8	1,399.2	4.4	6,398	3.5	972.5	4.6	4,447	3.8
1979[1]	220.6	.9	1,431.6	2.3	6,490	1.4	995.3	2.3	4,512	1.5
Low projections										
1990	236.3	.7	1,940	3.2	8,210	2.5	1,360	3.2	5,760	2.5
2000	245.9	.4	2,410	2.2	9,800	1.8	1,690	2.2	6,870	1.8
2010	250.9	.2	2,940	2.0	11,720	1.8	2,060	2.0	8,210	1.8
2020	253.0	.1	3,410	1.5	13,480	1.4	2,390	1.5	9,450	1.4
2030	249.3	−.1	4,000	1.6	16,040	1.8	2,800	1.6	11,230	1.7
Medium projections										
1990	243.5	.9	2,070	3.7	8,500	2.8	1,450	3.7	5,950	2.8
2000	260.4	.7	2,690	2.7	10,330	2.0	1,880	2.6	7,220	2.0
2010	275.3	.6	3,440	2.5	12,500	1.9	2,410	2.5	8,750	1.9
2020	290.1	.5	4,190	2.0	14,440	1.5	2,930	2.0	10,100	1.4
2030	300.3	.3	5,160	2.1	17,180	1.8	3,610	2.1	12,020	1.8
High projections										
1990	254.7	1.2	2,200	4.2	8,640	2.9	1,540	4.2	6,050	2.9
2000	282.8	1.1	3,010	3.2	10,640	2.1	2,110	3.2	7,460	2.1
2010	315.2	1.1	4,050	3.0	12,850	1.9	2,840	3.0	9,010	1.9
2020	354.1	1.2	5,180	2.5	14,630	1.3	3,630	2.5	10,250	1.3
2030	392.8	1.0	6,700	2.6	17,060	1.5	4,690	2.6	11,940	1.5

[1]Preliminary.

Note: Annual rates of increase were calculated for the various periods indicated, except for the 1990 projections which were derived from the 1977 trend level ($1,290 billion) for gross national product.

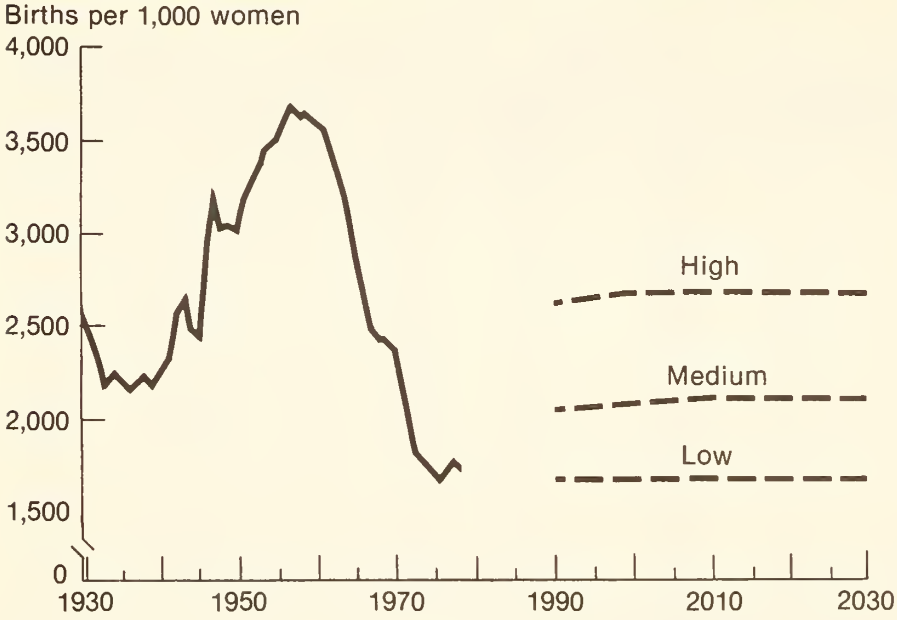
Sources: Population: U.S. Department of Commerce, Bureau of the Census. *Population estimates and projections.* Curr. Pop. Reps. Ser. P-25. 1929–69—"Estimates of the population of the United States and components of change: 1940 to 1978." No. 802, 1979. 1970–79—"Estimates of the population of the United States to October 1, 1980." No. 894, 1980. Projections—"Projections of the population of the United States: 1977 to 2050." No. 704, 1977.

Gross national product: Council of Economic Advisers. 1929–79—*Economic report of the President.* January 1980. Projections, Medium—U.S. Department of Commerce, Bureau of Economic Analysis. Unpublished data. Projections, Low and High—U.S. Department of Agriculture, Forest Service.

Disposable personal income: Council of Economic Advisers. 1929–79—*Economic report of the President.* January 1980. Projections—U.S. Department of Agriculture, Forest Service.

Figure 2.2

Total Fertility Rates, 1929–79, with Projections to 2030



fertility rate is below this figure and approximates a level which would end population growth in the first part of the twenty-first century.

Legal immigration accounts for a significant part of population growth, and the estimates shown in table 2.1 include a net addition of 400,000 immigrants each year. Legal immigration has declined recently and some further reduction could result from growing national concern about unemployment and population pressure on resources and the environment. No allowance has been made for illegal immigration.

The geographic distribution of the population has a strong influence on State and regional demands for some products made in whole or in part from wood and particularly those that must be produced and consumed at the same place. State projections prepared by the Bureau of Economic Analysis[4] are used as the basis for regional projections in this work. They show significant differences in population trends among the States and regions. In general, the most rapid growth will be in the South and on the Pacific Coast. Rapid growth is also likely in some areas in the Rocky Mountains. The major population concentrations, however, will be much as they are today in the North Central region and in the regions along the Atlantic and Pacific coasts.

The age distribution of the population is another significant factor in estimating the demand for many products, especially for housing. The Bureau of the Census projections of age classes associated with the population projections shown in table 2.1 have been used in this study. These projections indicate a substantial increase during most of the projection period in the number and proportion of people in the middle-age classes—the classes that have the highest income levels and the largest demands for goods and services.

Population is also important as a determinant of the labor force, which in turn is a major determinant of the gross national product. The labor force associated with the medium population projection is expected to grow somewhat more rapidly than total population during most of the projection period. This largely reflects increased female participation in the labor force—which is associated with the relatively low fertility rates underlying the medium projection.[5] The age structure is also important, however, and changes in the distribution by age classes are expected to result in a fairly sharp decline in the rate of growth in the labor force after 2010.

In addition to the size of the labor force, the average number of hours worked per year has a substantial impact on the gross national product, and on demand for raw materials and products. Historical trends in the hours worked per year show a slow decline that is projected to continue through 2030. Although the decline is slow, the projected average hours worked per year in 2030 is some 317 hours below the 1975 average, the equivalent of about eight 40-hour weeks.

Gross National Product

In recent decades, changes in the consumption of most timber products have been closely associated with changes in the Nation's gross national product.

Between 1929 and 1977, the gross national product, measured in constant 1972 dollars, increased more than four times—rising at an average annual rate of 3.1 percent (table 2.1, fig. 2.3). Year-to-year changes have fluctuated widely, from as much as +16.0 percent to −14.7 percent (fig. 2.4). The highest sustained rate of growth in gross national product occurred in the 1960's when it averaged 4.0 percent per year.

The wide fluctuations in year-to-year changes in growth in the gross national product have reflected short run cycles in such factors as rates of unemployment, hours worked per year, and productivity. Cycles in these factors will presumably continue to cause similar fluctuations in the years ahead. But for this assessment, only trends in growth were considered, and projections were based on the following assumed rates of increase:

Period	*Low*	*Medium*	*High*
		(Percent)	
1977-89	3.2	3.7	4.2
1990-99	2.2	2.7	3.2
2000-09	2.0	2.5	3.0
2010-19	1.5	2.0	2.5
2020-29	1.6	2.1	2.6

[4] U.S. Department of Commerce, Bureau of Economic Analysis. Population, personal income and earnings by State projections to 2030. Govt. Print. Off., Washington, D.C., 25 p. 1977.

[5] The alternative assumptions of fertility rates underlying the low and high population projections result in substantial differences in the rate of growth in the labor force. The highest rates of growth would be associated with the low population projection because with the associated low fertility rates more females would be free to join the labor force. Conversely, the lowest rate of growth in the labor force would be with the high population projection and the associated high fertility rates.

Figure 2.3

Gross National Product, 1929-79, with Projections to 2030

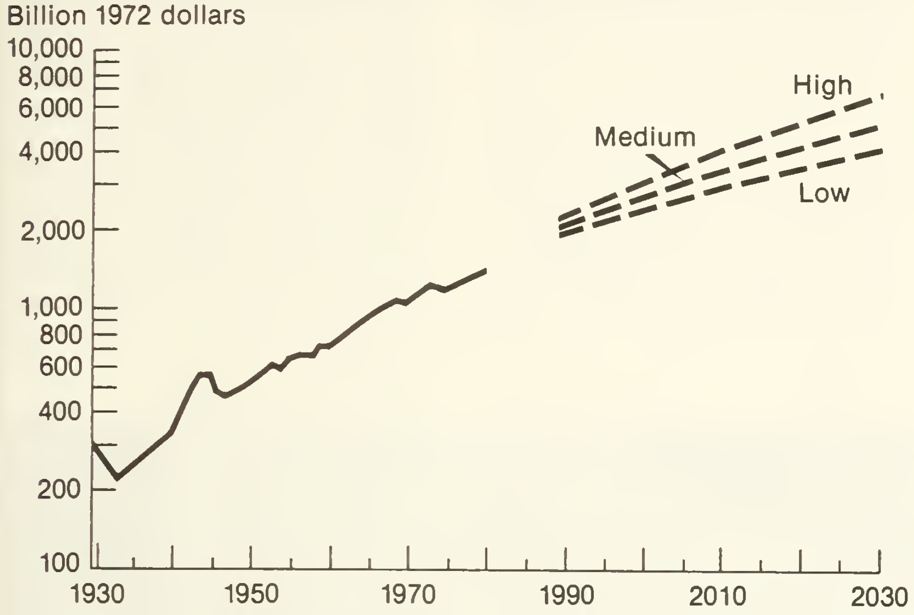
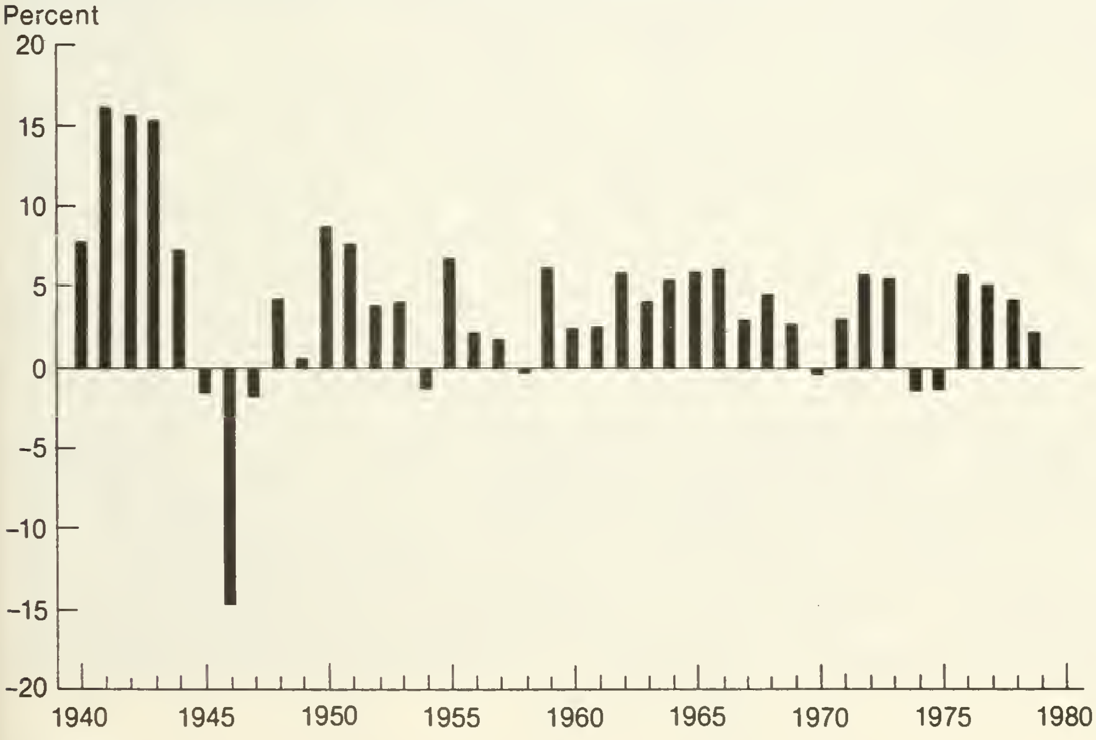


Figure 2.4

Annual Change in Gross National Product*, 1940–79



*1972 dollars

The assumed medium rates for the decades beyond the 1970's are based upon projections of the Bureau of Economic Analysis.[6] These in turn are based in part upon the medium projections of population and the associated projections of labor force and hours worked per year. The low and high rates are Forest Service assumptions which are chosen to display a range over which growth rates are likely to vary.

The medium rate of growth would result in a gross national product of $2,690 billion (1972 dollars) in 2000—some two times that of 1977 (table 2.1). By 2030, this projection would reach $5,160 billion—some four times that of 1977. The associated projection of per capita gross national product in 2030 rises to $17,180—nearly three times the 1977 average.

The detailed Bureau of Economic Analysis projections of gross national product by industry indicate that the proportion of the gross national product originating in manufacturing and construction activity will decline slowly over the projection period. Transportation, trade, and other services account for a slowly growing share of the total. These changes are consistent with long established trends.

Even though there is some decline in relative importance, the projected increases in manufacturing and construction are large. This means that the U.S. economy will continue to produce huge quantities of physical goods. In turn, large supplies of energy, minerals, and other raw materials will be needed to produce those goods.

The future adequacy of supplies of many raw materials, and especially energy, is currently a matter of wide-

[6] U.S. Department of Commerce, Bureau of Economic Analysis. Unpublished data. 1979.

There may be another 80 million people in the United States by 2030 and per capita incomes may triple. This means that the Nation is faced with the task of meeting the resource demands of 300 million persons with much greater purchasing power than today's population.

spread concern. Concern is also evident about the ways the various programs designed to protect and improve the environment will affect the kinds of goods produced, person-hour productivity, and various other factors that influence economic growth. Of course, no one knows how things will work out. Up to this time, economic activity has continued to increase much as it has in the recent past. Thus, it appears that the economic growth assumptions adopted provide an acceptable basis for evaluating future demands for forest and range land products and a partial basis for guiding management policies and programs during the next several years. After that, and as required by the Forest and Rangeland Renewable Resources Planning Act, the outlook will be reevaluated within the late 1980's and new expectations on economic growth incorporated in the next Assessment of the timber situation.

Disposable Personal Income

Disposable personal income, i.e., the income available for spending or saving by the Nation's people, has been another important determinant of the demand for some timber products, including various grades of paper and board. It also influences household formation, size of dwellings, and furniture consumption—all important determinants of the demand for lumber and other timber products.

Since 1929, disposable personal income has equaled about 70 percent of the gross national product. This historical and rather constant relationship was assumed to continue through the projection period (table 2.1).

The resulting estimates (medium level) show per capita disposable personal income rising to $12,020 by 2030 (1972 dollars) nearly three times the 1977 average. Growth of this magnitude means that the Nation is faced not only with the task of meeting the timber demands for an additional 80 million people, but also the demands of 300 million people with much greater purchasing power than today's population.

Institutional and Technological Change

In the past, institutional and technological changes have substantially influenced use of timber products and the management and use of timber resources. Increasing urbanization, for example, has led to an increased demand for some types of structures and been an important source of the intensifying concern about the environment. It has also caused important shifts in the use of raw materials including the partial displacement of timber products by steel, concrete, and other materials suitable for use in large urban structures.

Technological changes have also affected the demand for certain products. For example, the development of economical water-resistant adhesives for exterior grades of plywood has led to huge increases in plywood use, and was a major factor in holding down the consumption of lumber for a period of roughly two decades. Similarly, new technology has led to large increases of hardwood lumber use for pallets and of panel products such as hardboard and particleboard in a wide variety of end uses. On the other hand, innovations in the metals and plastics industries have resulted in displacement of lumber and plywood in products such as furniture and containers.

At any time, potential institutional and technological changes on the horizon could affect the demands for renewable resources. But the nature and effect of many of these potential changes are likely to be similar to changes that have taken place in the past and that are accounted for in the use of historical data in preparing the projections.

A recent development not adequately reflected in the historical data base is the growing constraints on the extractive, manufacturing, and energy industries to satisfy environmental and health objectives. These and further constraints are certain to have major impacts over the projection period. Although it is too early to define the changes that will actually take place and their overall impacts with any certainty, prospective increases in such constraints have been taken into account in projecting economic activity and demands and supplies of timber and timber products.

A related development, the reservation of forest and range lands for designated uses such as wilderness, parks, and wildlife refuges, has been going on for a long time and is specifically taken into account in the projections of commercial timberland areas.

Energy Costs

Changes in energy costs have substantial effects on the demand for timber and timber products, both through their influence on the level of economic activity [7] and through their direct impact on the use of products.[8]

The unit cost of energy minerals, which today accounts for the bulk of United States energy production, decreased steadily from about 1870 to the late 1960's.[9] Since then, however, there have been very large increases in energy prices, with the average relative price of crude oil in the United States more than doubling, and the price of coal and natural gas also doubling. At the same time, dependence on relatively high-cost imported crude oil and petroleum products has also grown rapidly.

A long historical period has obviously ended. During that time, improvements in technology offset the increase in costs as more energy materials were produced from lower quality and less accessible resources. Many of the remaining petroleum reserves are concentrated in areas such as interior Alaska,

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[7] Edward Fried and Charles Schultze (*In* Higher oil prices and the world economy. The Brookings Institution, Washington, D.C. 1974 p. 47, 54) estimated that the increase in world oil prices will result in a decrease in aggregate demand in the United States of 0.4 percent in 1980 and that these higher prices will reduce the rate of economic growth by 0.1 to 0.2 percent in the early 1980's. Edward Denison (*In* Effects of selected changes in the institutional and human environment upon output per unit of input. Survey of Current Business. U.S. Department of Commerce. January 1978, p. 21–44) stated that pollution abatement regulations have substantially lowered the rate of increase in output per unit of input in the United States and that the effect of these regulations is becoming more pronounced. He estimated that output in the nonresidential business sector in 1975 was 1.0 percent smaller than it would have been without such pollution abatement regulations.

[8] The estimates by Fried and Schultze of the effect of higher oil prices (see footnote 7) were for the U.S. economy as a whole. There are no comparable estimates of the impacts of recent increases in energy prices on the use of various materials. However, it is evident that there will be a tendency to increase use of those materials that require relatively little energy in use and processing at the expense of substitute resources that require relatively large amounts of energy, and vice versa. For example, lumber and plywood are likely to be substituted to some extent for steel and concrete, both of which have high energy requirements in processing.

[9] Harold Barnet and Chandler Mose (*In* Scarcity and growth. The Johns Hopkins Press 1963, p. 164–201) show that the unit cost of energy minerals declined from 1870 to 1957. Data for recent years show a continuation of this downward trend in relative energy prices until 1969. See, for example, the New York Times National Economic Survey, January 8, 1978.

the Arctic, and the outer continental shelf where the physical environment is severe and where development, operating, and transportation costs are high. Production of oil from shale and tar sands, which may begin before the end of this century, will entail very high development costs. In recent years, programs to protect the environment have also added to energy costs.

In summary, it seems fairly clear that the use of increasingly high-cost energy reserves, the removal of remaining controls on natural gas and second-tier oil prices, and added environmental protection costs are likely to push energy prices still higher relative to the general price level. At this time, there are no authoritative and generally accepted estimates of the size of the future increases. It does seem, however, that substantial and persistent upward movement is in prospect. This has been taken into account in projecting demands and supplies for those products where the higher prices can be expected to have a significant effect.

Capital Availability

Large amounts of capital will be required to make the necessary investments in management, physical facilities, and processing plants to accommodate increased demands for timber products. Far larger amounts of capital will be needed to make possible the levels of overall economic growth that are projected in this chapter. It is reasonable to ask whether such vast amounts of capital will be available to develop new energy sources, meet environmental protection requirements, provide for general economic activity, and meet the demands for timber products. However, when potential capital requirements are compared with past investment rates and with expected growth in gross national product, future requirements for capital do not appear particularly imposing. They seem likely to fall well within the range of experience in the United States and western European countries.[10] It has, therefore, been assumed that capital availability will not significantly constrain long-term economic growth in general or intensified use of forest lands and the production of timber products.

Other Assumptions

In addition to the general assumptions outlined above, the projections of demands and supplies for the products included in this document rest on a variety of other specified and implied assumptions. The most important are described in the appropriate places in the chapters that follow. Such assumptions include those on prices, changes in commercial timberland areas, management intensities, the continuation of past relationships between variables, and constraints on the use and management of commercial timberland associated with multiple-use.

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[10] Hagenstein, Perry R. Basic assumptions on energy supplies and costs, technological and institutional change for the 1980 RPA assessment. Unpubl. rep. to the Forest Service, U.S. Department of Agriculture. 21 p. 1978.

Chapter 3
Demand for Timber

This chapter presents information on recent trends in the consumption of timber by major product and in total, with projections of demands to 2030.

The projections of demand indicate the volume of timber products, and of roundwood and sawtimber, likely to be consumed under the specified or implied assumptions on the major determinants of demand such as population, economic activity, disposable personal income, and technological and institutional changes described in Chapter 2.

Price Assumptions

Prices will be another major determinant of the demand for timber products. In the past, price changes, both actual and relative to substitute materials such as steel and plastics, have had significant impacts on the consumption of most timber products. A number of closely related factors such as installation and maintenance costs, performance, and useful life have also affected actual and relative use.

From 1950 through the mid 1970's —the period during which the data on timber products consumption used in this analysis were collected—there were differing trends in the prices of the major timber products as shown in the tabulation below:

Product	*Annual rate of change in prices measured in constant 1967 dollars*[1]
Lumber	
Softwood	0.7
Hardwood	0.7
Plywood	
Softwood	0.0
Hardwood	0.0
Paper and board	0.0

Lumber prices rose at an average annual rate of 0.7 percent during these years. There were no clearly defined upward or downward trends for the other major products.

The data on consumption used in making the projections of demand for these products shown in following sections of this chapter reflect, in part, price changes in the 1950–76 period. However, there is no way of isolating the impact from all the other forces that affected the use of timber products in this base period. Thus, as a practical matter, it was necessary to assume that the price trends or price levels of the base period 1950–76 would continue through the projection years and continue to affect demand for timber products in much the same way. The projections derived in this way are the base level projections of this study.

Such assumptions on future prices will be realized only if the supplies of timber (stumpage) are adequate to meet the projected demands for timber products. The base level projections of timber supplies presented in Chapter 7 indicate that if timber owners continue to respond to stumpage price and inventory changes and manage their timberlands much as they have in the recent past, timber supplies will not be large enough to meet the projected demands, especially for softwood sawtimber products. Thus, unless action is taken to raise timber growth and improve timber utilization, the increases in timber product prices will be more rapid than those in the base period and the associated projections of demands lower than shown in this chapter. The size of such price increases and the associated impacts on the demands for timber products are discussed in Chapter 8. The effects of rising prices on the society, the economy, and the environment are also explored. The opportunities to increase and extend timber supplies, and these opportunities are large, are described in Chapters 9 and 10.

Demand for Timber Products in New Housing

New housing has long been the largest single market for timber products in the United States. In 1976, about 38 percent of the lumber, 40 percent of the plywood, and substantial volumes of other wood-based panel products were used for new housing construction. Wood products are expected to continue as the major homebuilding materials, and future demand for housing will be especially important in determining total timber demands.

The volumes of timber products consumed in new residential construction are dependent on the numbers of housing units built and the amounts and types of wood products used in each. Consequently, projections of future demand for timber products in new housing in this analysis are derived from estimates of: (1) Future housing demand, (2) trends in unit size and other characteristics, and (3) trends in the use of timber products in each type of unit. Basic housing demand, composed of demand created by new household formations, replacement of housing destroyed or retired from the housing inventory, and maintenance of an inventory of vacant units for sale, rent, or held for other purposes such as a second home, is analyzed first. Total demand is further evaluated for the types of units likely to be built—that is, single-family, multifamily, and mobile homes—because of the substantial differences between them in average lumber and other timber products use. This is followed by an evaluation of the use of timber products per unit of housing produced and projections of total demand for the various products in the housing sector.

About two-fifths of the lumber and plywood consumed in the United States is used in the construction of new housing.

Household Formation. The most important component of U.S. housing demand has been net household formation—the average annual change in the number of households. Although there have been rather wide year-to-year fluctuations, net household formations have increased from an average of about 557,000 annually in the 1920's to over 1.5 million between 1970 and 1977 (table 3.1). This trend resulted in more than tripling the total number of households during the 57-year period between 1920 and 1977.

Headship rates.—Household formations depend both on total growth in

[1]Prices in current dollars adjusted to exclude inflation or deflation. The rates of change were calculated from least squares regression lines fitted to time series price data (measured in 1967 dollars) for the years 1950–76.

Table 3.1—*Households and household formations in the United States, specified years 1920–77, with projections to 2030*

Year	Total households	Average annual household increase[1]		Persons per household
	Thousands	*Thousands*	*Percent*	*Number*
1920	24,436	.....	...	4.3
1930	30,002	557	2.1	4.1
1940	34,964	496	1.5	3.8
1950	42,969	800	2.1	3.5
1960	53,024	1,005	2.1	3.4
1970	63,417	1,039	1.8	3.2
1977	74,142	1,532	2.4	2.9
		Low projections[2]		
1990	94,100	1,510	1.8	2.5
2000	104,000	990	1.0	2.4
2010	112,200	820	.8	2.2
2020	120,600	840	.7	2.1
2030	125,600	500	.4	2.0
		Medium projections[2]		
1990	94,800	1,570	1.9	2.6
2000	105,400	1,060	1.1	2.5
2010	115,500	1,010	1.0	2.4
2020	124,600	910	.8	2.3
2030	130,600	600	.5	2.3
		High projections[2]		
1990	95,400	1,620	2.0	2.7
2000	106,600	1,120	1.2	2.7
2010	119,900	1,330	1.3	2.6
2020	130,200	1,030	.8	2.7
2030	138,800	860	.7	2.8

[1]Average annual increase for decade ending on December 31 of preceding year for projections (see note below). Average for 1977-90 is calculated for 13-year period. Rates of change calculated on unrounded data.

[2]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Historical data on households are for decennial census dates, generally April 1.

Sources: U.S. Department of Commerce, Bureau of the Census. 1920-60—*United States census of housing, 1960.* HC(1)-1. 1963; 1970—*1970 census of housing.* HC(VI)-1. 1971; 1977—*Household and family characteristics: March 1977.* Curr. Pop. Reps. Ser. P-20, No. 305. 1978.

Projections: U.S. Department of Agriculture, Forest Service.

population and on the number of individuals willing and able to occupy separate dwelling units. The latter, in turn, is determined largely by the age structure of the population and attendant social and economic factors such as level of income, and is expressed by headship rates, that is, the proportion of the population in each age group that heads separate households.

There is a well-defined relationship between age and headship (table 3.2, fig. 3.1). Typically, headship rates rise rapidly from the 18- to 24-year age class to the 25- to 29-year age class, and continue up slowly until about two-thirds of all individuals 65 or over maintain a separate household.

Headship rates increased significantly in all age groups between 1940 and 1977, in part because of rising incomes and in part due to changes in social mores. Projections of headship rates, based on past relationships with real disposable personal income (fig. 3.2) and expectations about further change in social values, indicate a continuing rise for all age groups through the projection period (table 3.2).

Projected household formations.—Projected household formations—based on the assumed headship rates and Bureau of the Census medium level projections of population by age group—continue at relatively high levels in the 1980's, averaging 1.57 million for the decade (table 3.3). After the 1980's, however, household formations generally decline, dropping from about 1.1 million in the 1990's to only 600,000 annually in the period from 2020 to 2029. Under the low and high assumptions on population and economic growth, average annual household formations in 2020–29 range from 500,000 to 860,000, a reflection of the differing estimates of future fertility rates and income.

The number of persons per household—inversely related to headship—has declined from 4.3 in 1920 to 2.9 in 1977. The projected headship rates indicate that household size will continue to decline with the medium projection reaching 2.3 in 2030 (table 3.1).

Although household formations continue to be a major source of demand for housing through the projection period, they decline in importance relative to replacements. For example, between 1970 and 1977 household formations accounted for about 71 percent of total housing demand (table 3.3, fig. 3.3). By the decade prior to 2030, however, the medium projection indicates that only 30 percent of total demand will be generated from that source.

Households by age class.—A relatively higher proportion of young household heads live in apartments and mobile homes, whereas middle-aged and older household heads live predominately in single-family houses. Consequently, changes in the distribution of households by age class are important determinants of demand for the various types of housing units.

Fluctuations in the number of births result in subsequent wide swings in the number of households by age class and related changes in types of housing units demanded. For example, the large number of births during the "baby boom" years of the 1940's and 1950's followed by sharp declines in births in the late 1960's and early 1970's has resulted in a large concentration of households currently headed by individuals under 35 years old.

As these individuals age, the number of households by age class will change. In the 1980's, for example, the number of households with heads aged 18 to 24 declines substantially after doubling between 1960 and 1975. During the same period, the number of household heads aged 30 to 44 is projected to increase by about 800,000 annually. In the 1990's, most households will be concentrated in the older middle-age groups with heads 45 to 64, and finally by 2019 there will be a large number of households headed by persons over 65.

Table 3.2—*Headship rates in the United States, by age class, specified years 1940–77 with projections to 2030*

(Percent)

Year	Age class						
	18-24	25-29	30-34	35-44	45-54	55-64	65 and over
1940	8.2	28.2	37.7	44.6	50.7	54.0	56.8
1950	13.1	33.9	39.9	44.8	49.2	52.0	52.8
1960	15.8	39.3	44.9	48.0	53.0	54.7	56.8
1970	17.6	44.5	48.8	50.7	52.7	58.3	62.9
1977	21.2	47.3	52.1	53.6	55.0	58.1	63.7
Low projections[1]							
1980	21.3	48.0	52.4	53.9	54.9	58.5	64.6
1990	23.3	51.6	54.4	55.0	55.8	59.5	66.5
2000	25.4	54.2	55.8	56.0	56.6	60.2	67.4
2010	27.2	55.7	56.6	56.6	57.2	60.6	67.8
2020	28.5	56.5	56.9	56.9	57.6	60.8	68.0
2030	29.3	56.9	57.0	57.0	57.8	60.9	68.0
Medium projections[1]							
1980	21.4	48.2	52.5	53.9	54.9	58.6	64.7
1990	23.8	52.5	54.8	55.1	56.0	59.7	66.8
2000	26.4	55.1	56.3	56.2	57.0	60.4	67.7
2010	28.2	56.4	56.8	56.8	57.5	60.8	67.9
2020	29.2	56.8	57.0	57.0	57.8	60.9	68.0
2030	29.7	57.0	57.0	57.0	57.9	61.0	68.0
High projections[1]							
1980	21.4	48.4	52.5	53.9	54.9	58.6	64.8
1990	24.4	53.3	55.2	55.2	56.3	60.0	67.1
2000	27.1	55.7	56.5	56.3	57.2	60.6	67.8
2010	28.7	56.6	56.9	56.8	57.7	60.9	68.0
2020	29.5	56.9	57.0	57.0	57.9	61.0	68.0
2030	29.8	57.0	57.0	57.0	58.0	61.0	68.0

[1]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Headship rate is the percentage of persons in each age class that heads a household.

Sources: 1940-70—Marcin, Thomas C. *Projections of demand for housing by type of unit and region.* U.S. Dep. of Agric. Handbk. 428, 76 p., 1972. 1977—Forest Service estimates derived from U.S. Department of Commerce, Bureau of the Census. *Population characteristics.* Curr. Pop. Reps. Ser. P-20, No. 305, 1977, and *Population estimates and projections.* "Projections of the population of the United States: 1977 to 2050." Curr. Pop. Reps. Ser. P-25, No. 704, 87 p., 1977.

Projections: U.S. Department of Agriculture, Forest Service.

Vacancies. A second major component of housing demand is vacancy change. For the purposes of this report, vacancies have been divided into (1) units for sale or rent, and (2) second homes and other units not available for sale or rent.

The first category includes year-round units intended for occupancy as a primary residence and on the market for sale or rent, and units sold or rented and awaiting occupancy. Vacancy rates for this category have varied widely (table 3.4). An average of about 3.5 percent of housing units has fallen into this category in the past three decades and this level is assumed to continue throughout the projection period.

The second category of vacancies includes units intended for seasonal occupancy, plus units held for occasional use (second homes), units temporarily occupied by persons who have a usual place of residence elsewhere, and units held for personal reasons of the owner. In recent years, units in this category have composed between 3.8 and 5.8 percent of the housing inventory. Demand for seasonal units is related to per capita disposable personal income and to the numbers of people in the middle-to-older age groups. During the projection period, this category of vacancies is assumed to rise moderately to 6.5 percent, reflecting primarily the assumptions on rising income and population age structure.

Projected total vacancy rates rise from the 1977 level of 7.6 percent to 9.3 percent in 2000 and 10.0 percent in 2030 (medium level) (table 3.4). The demand for new housing unit production associated with these rates is estimated to fall gradually from about 190,000 annually in the 1980's to about 100,000 in the decade of the 2020's (medium level) (table 3.3, fig. 3.3). This drop is because of the somewhat slower future growth of the housing inventory due to the decline in net household formations after 1990.

Projections of demand for housing must include an allowance for vacancies, i.e., the units for rent or sale or used for seasonal occupancy.

These vacancy rates and associated housing demands do not include vacant mobile homes, since these units are not counted in the housing inventory by the Bureau of the Census and thus data are not available. However, the estimates of future mobile home demand shown in table 3.6 and figure 3.4 do include allowances for mobile homes that are vacant or used as second homes as well as for mobile homes used for nonhousing purposes.

Housing Replacement. The third major component of housing demand is for replacement of units lost from the housing inventory because of fire, flood, or other disaster, and units retired because of abandonment, dilapidation, energy inefficiency, unfavorable location, or other factors.

Total replacements increased from an average of about 100,000 units in the 1920's and 1930's to nearly 700,000 in the 1960's (table 3.5). This rise reflected such factors as shifts of pop-

Figure 3.1

Headship Rates by Age Class, 1950 and 1977, with Projections for 2030

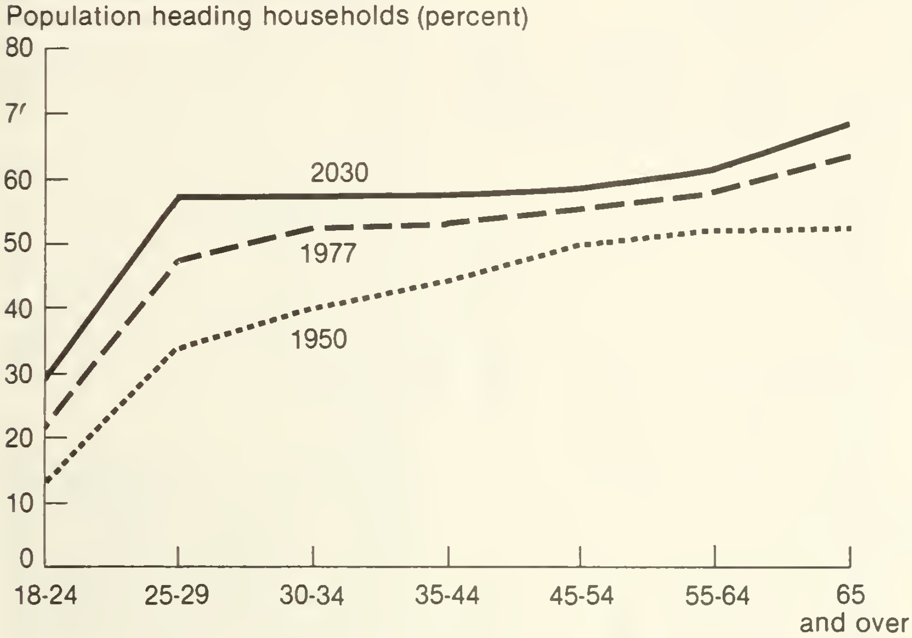
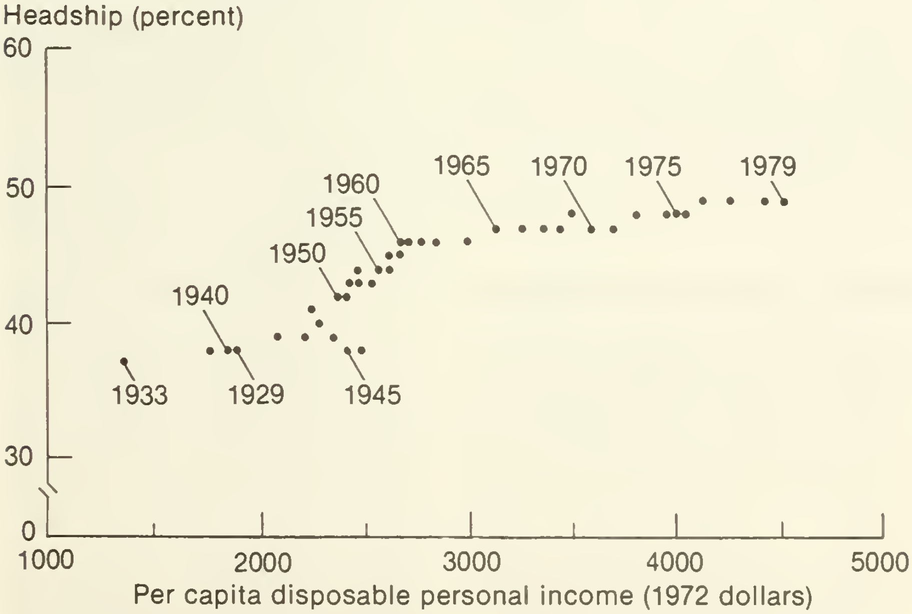


Figure 3.2

Headship in Relation to Per Capita Disposable Personal Income for Population 18 Years of Age and Older, Selected Years 1929–79



ulation from farms and small towns to urban areas and the subsequent need for replacement of many abandoned housing units. Urban renewal and highway construction programs led to the removal of many dwellings in the 1950's and 1960's. Some dwelling units were converted to nonhousing uses or simply dropped out of the housing inventory, such as a basement apartment no longer offered for rent, or a mobile home that became vacant and consequently was not counted in the housing inventory.

Between 1970 and 1977, total replacements declined to an average of 515,000 units annually because of continued strong housing demand coupled with restricted new unit availability due to the decline in housing production in 1974 and 1975. However, rising personal income and public housing programs to eliminate substandard housing units suggest that this decline is only temporary.

In view of the growing number of older units in the Nation's housing stock, the need to replace older energy inefficient houses, projected increases in per capita income, and the larger proportion of mobile homes with shorter average lives in the inventory, it has been assumed that replacement rates will again rise to near 1.0 percent in the 1990's and early 2000's under the medium projection. The declines in the 2010–2030 period reflect a slowing in the proportion of mobile homes in the inventory and the assumption that they will continue to become larger and more houselike and need to be replaced less often than at present.

With the assumed replacement rates and a growing housing inventory, demand for replacement units increases rapidly in the years ahead. By the end of the century, replacement demand is projected to reach nearly 1.1 million units annually and to continue up to more than 1.3 million in the last decade of the projection period.

Conversions. Conversion of existing housing units into two or more units, and conversion of nonresidential structures to housing units, has at times met a substantial part of the Nation's housing demands. In the 1930's and 1940's, for example, more than one-third and one-fourth, respectively, of all units provided came from such conversions. Projected housing replacement demands include an allowance of 100,000 net conversions per year—about the same number as in the 1960's and 1970's (table 3.5). The remaining housing demand will be filled by new housing construction.

Table 3.3—*Average annual demand for new housing in the United States, by source of demand, specified periods 1920–77, with projections to 2030*

(Thousand units)

Period	Total demand	Household formations	Vacancies—conventional units	Net replacements: Total	Net replacements: Conventional units	Net replacements: Mobiles used as primary residences	Mobiles not used as primary residences
1920–29......	803	557	239	8	....	...	..
1930–39......	365	496	−23	−108	....	...	..
1940–49......	809	800	81	−72	....	...	..
1950–59......	1,522	1,005	228	267	....	...	22
1960–69......	1,648	1,039	−23	591	....	...	41
1970–77......	2,145	1,532	120	415	....	...	78
			Low projections[1]				
1980–89......	2,490	1,510	160	750	580	170	70
1990–99......	2,080	990	120	910	730	180	60
2000–09......	1,970	820	110	980	800	180	60
2010–19......	2,060	840	110	1,050	870	180	60
2020–29......	1,720	500	80	1,090	930	160	50
			Medium projections[1]				
1980–89......	2,590	1,570	190	760	580	180	70
1990–99......	2,240	1,060	150	970	780	190	60
2000–09......	2,300	1,010	140	1,080	880	200	70
2010–19......	2,270	910	130	1,160	970	200	70
2020–29......	1,980	600	100	1,220	1,030	190	60
			High projections[1]				
1980–89......	2,700	1,620	190	820	630	190	70
1990–99......	2,410	1,120	160	1,060	850	210	70
2000–09......	2,760	1,330	170	1,180	960	220	80
2010–19......	2,550	1,030	140	1,300	1,070	230	80
2020–29......	2,450	860	130	1,380	1,150	230	80

[1]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Sources: Household formations: U.S. Department of Commerce, Bureau of Census. 1920-60—*United States census of housing, 1960.* HC(1)-1. 1963; 1970—*1970 Census of housing.* HC(VI)-1. 1971. 1977—*Population characteristics.* Curr. Pop. Reps. Ser. P-20, No. 305, 1977.

Vacancies: Forest Service estimates based on data from U.S. Department of Commerce, Bureau of the Census. 1920–50—*Historical statistics of the United States, colonial times to 1957.* 1960; 1960-70—*1970 census of housing.* HC(VI)-1. 1971. 1977—*Annual housing survey: 1977.* Ser. H-150-77. 1979.

Replacements: Forest Service estimates based on data from U.S. Department of Commerce, Bureau of the Census, 1920-50—*Historical statistics of the United States, colonial times to 1957.* 1960; 1960-70—*1970 census of housing.* HC(VI)-1. 1971. 1977—Derived from housing start, vacancy change, and inventory data.

Mobiles not used as primary residences: Forest Service estimates based on data from U.S. Department of Commerce, Bureau of the Census. *United States census of housing, 1960.* vol. IV, Pt. 1-A. 1962.

Projections: U.S. Department of Agriculture, Forest Service.

Total Demand for New Housing. The total number of new housing units produced in the United States rose from about 800,000 annually in the 1940's to over 2.1 million in the period from 1970 to 1977 (table 3.6). During the 1950's and 1960's about 1.6 million units a year were produced.

Despite this generally rising trend, the number of housing units produced has been highly variable with annual output substantially above or below the decade averages (fig. 3.4). For example, in 1972 total housing production (including mobile homes) reached nearly 3 million units, more than double the 1.4 million units produced in 1966 and 38 percent greater than the average for 1970–77. Production again reached a low of 1.4 million units in 1975, before recovering to about 2.3 million units in 1977 and 1978. Such year-to-year variation around the longer run trends will undoubtedly continue as a result of short-term demographic, economic, and institutional influences.

The trend-level projections of housing demand developed as described above show a rapid increase in the early 1980's—primarily a reflection of prospective household formations by heads born during the 1950's and early 1960's (fig. 3.3). Starting in the late 1980's and continuing into the 1990's, housing demand drops somewhat as a result of the sharp decline in births between 1965 and 1975. The medium level of housing demand is projected to fall to 2.2 million units by 2000 and to remain at about 2.3 million annually through 2020 before declining further to under 2 million by 2030. The high and low projections follow similar trends.

Demand for New Housing by Type of Unit. The type of housing units demanded is of major importance in projecting demands for timber products because of large differences in quantities of timber products used per unit.

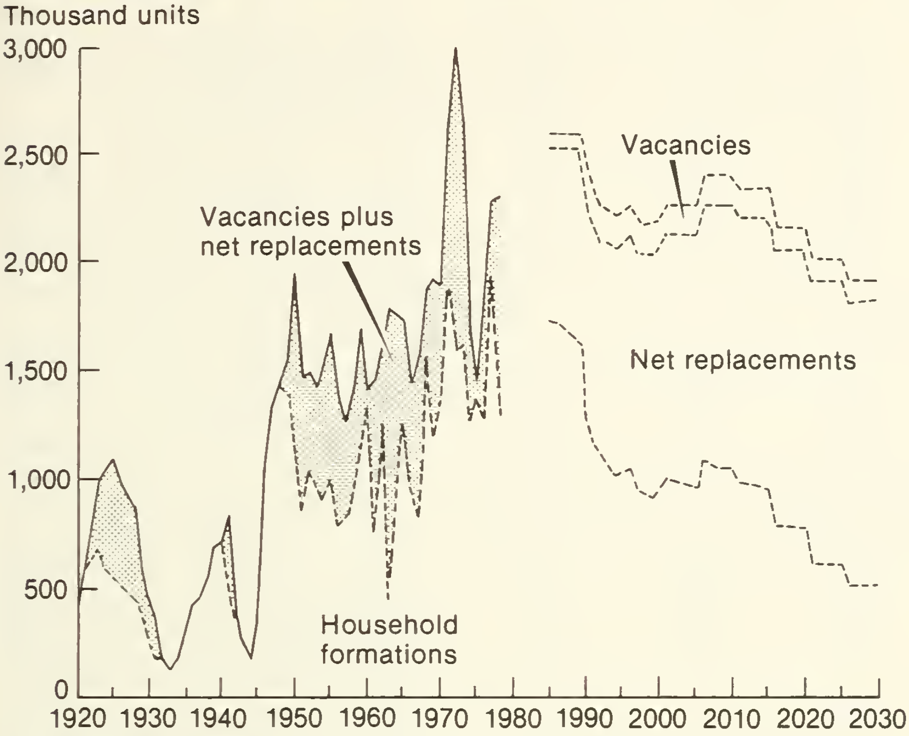
More than 70 percent of all housing units produced over the last 50 years has been of the single-family type (table 3.6, fig. 3.4). However, there has been wide variation in their relative importance. For example, the proportion of single-family housing units produced increased from about 65 percent in the 1920's to over 85 percent in the mid-1950's. In the late 1950's, single-family house production turned down and by 1969 only about 45 percent of the units produced was single-family. In 1973 the trend reversed again, and by 1979 single-family homes accounted for over two-thirds of all housing production.

From the 1920's through most of the 1950's, multifamily units accounted for nearly all of the remaining output. However, in the late 1950's the mobile home emerged as a significant source of new housing. Its share of the housing market grew to over 21 percent in 1973 before dropping to 12 percent in 1978.

The type of unit a household occupies is strongly related to family status and age of the household head. For example, the overwhelming majority of husband-wife households—some 79 percent in 1976—live in single-family houses. Over 85 percent of the husband-wife households had heads aged 35 to 64. Moreover, most households headed by persons over 65 continue to live in single-family houses regardless of family status. In 1976 about two-thirds of all such households lived in single-family houses, although some 56 percent of these were individ-

Figure 3.3

Demand for New Housing by Source of Demand, 1920–79, with Projections to 2030



ual households (one-person households or unrelated individuals living together).

Multifamily housing units are occupied largely by households with heads under 30 years of age and by individual households. About 54 percent of all households headed by persons under 35 and 50 percent of all individual households lived in multifamily housing units in 1976. The occupancy of mobile homes is highest among households with heads under 30.

With the exception of a small rise in mobile home occupancy, the relationships between family status and age of household head and the types of housing units occupied have changed relatively little in recent years. Consequently, in this study the occupancy rates by age class prevailing in the mid-1970's are assumed to continue through the projection period.

Because of prospective shifts in the age distribution of the population, and the associated changes in family type and income, the medium projection of demand for single-family units averages nearly 1.7 million units a year in the 1980's (table 3.6, fig 3.4). In the following decades, there is a slow decline to about 1.2 million units a year in the 2020–2029 period.

Multifamily demand is projected to move up moderately in the early 1980's to 570,000 units a year, about 25 percent of conventional housing production, before declining again in the late 1980's and 1990's. After the mid-1990's, the outlook changes and multifamily units again become more important as the second generation effects of the post-World War II "baby boom" are felt.

Projected demand for mobile homes for use as primary residences remains relatively constant through the projection period, as does the estimated 20 percent produced for vacation homes and for nonhousing purposes such as offices. Projected total demand for mobile homes thus averages about 300,000 units annually (medium level).

Timber Products Use Per Housing Unit. The types and amounts of timber products used per housing unit have changed over the past 20 years (table 3.7). In general, plywood and other wood-based panel products use per unit has increased significantly, while use of lumber has grown much more slowly.[2] These trends have resulted from such factors as changes in unit size and other structural and architectural characteristics, and materials substitution.

Trends in unit size.—The average size of new single-family housing units grew fairly steadily in the 1960's and 1970's, rising from about 1,355 square feet in 1962 to 1,760 square feet in 1979.[3] This growth, in part a reflection of rising real household income during the period, contributed to the increase in the use of plywood and other panel products per single-family unit and partially offset a downward trend in lumber use per square foot of floor area.

The size of units in multifamily structures also increased; however, the rise has been somewhat smaller and more erratic than for single-family houses. For example, multifamily unit size in 1979 was about 940 square feet, 9 percent above the average in the late 1950's but down nearly 100 square feet from 1972.[4]

Mobile homes have shown the most dramatic increase in size in recent years. In the early 1960's, most were single units, 10 feet or less in width and typically 29 to 45 feet in length. By 1970, most units were 12 or more feet wide and 50 or more feet long. In addition, a growing number were double-wide or expandable models. In 1976 nearly half were 14 feet wide, while double-wide units accounted for about a fourth of total shipments. As a result of these changes, average unit size rose by nearly two-thirds to 965 square feet in 1976 and continued up to 1,050 square feet in 1979.

It has been assumed that rising incomes and consumer preference for more space will lead to continued future growth in average size of all types of housing units produced. However, because of increasing fuel costs and changing household size, such increases are expected to be much slower than in the past decade-and-a-half. For example, the floor area of single-family houses is projected to reach 2,000 square feet by 2030, an increase of about 0.3 percent per year. Growth in the 1960's and 1970's averaged over 1.5 percent a year. The size of units in multifamily structures is expected to rise moderately to about 1,100 square feet, while mobile homes are projected to show the largest increase, growing to over 1,500 square feet as they become

[2] Between 1962 and 1976, average lumber use per unit in all types of housing rose about 0.3 percent a year, plywood use about 4.2 percent, and other types of wood-based boards 2.5 percent.

[3] U.S. Department of Commerce, Bureau of the Census. Characteristics of new housing: 1979. Constr. Reps. C25-79-13. Govt. Printing Off., Washington, D.C. 1980.

[4] *Ibid.*

Table 3.4—*Housing vacancies in the United States, specified years 1920–77, with projections to 2030*

Year	Vacant units	Proportion of housing inventory		
		Total	For sale or rent[1]	Not for sale or rent[2]
	Thousands	*Percent*	*Percent*	*Percent*
1920	200	0.8	([3])	([3])
1930	2,590	7.9	([3])	([3])
1940	2,361	6.3	4.1	2.2
1950	3,168	6.9	1.6	5.3
1960	5,444	9.3	3.5	5.8
1970	5,227	7.6	3.5	4.1
1977	6,168	7.6	3.3	3.8
Low projections[4]				
1990	9,030	8.8	3.5	5.3
2000	10,200	9.0	3.5	5.5
2010	11,200	9.1	3.5	5.6
2020	12,300	9.3	3.5	5.8
2030	13,100	9.5	3.5	6.0
Medium projections[4]				
1990	9,400	9.0	3.5	5.5
2000	10,830	9.3	3.5	5.8
2010	12,200	9.6	3.5	6.1
2020	13,400	9.8	3.5	6.3
2030	14,360	10.0	3.5	6.5
High projections[4]				
1990	9,400	9.0	3.5	5.5
2000	11,000	9.3	3.5	5.8
2010	12,700	9.6	3.5	6.1
2020	14,000	9.8	3.5	6.3
2030	15,300	10.0	3.5	6.5

[1]Data for 1960, 1970, 1977, and projections include units available for sale or rent and units sold or rented awaiting occupancy. For 1940 and 1950, units sold or rented awaiting occupancy not included.

[2]Data for 1960, 1970, and 1977, and projections include seasonal units, units held for occasional use, temporarily occupied units, and units held for personal reasons of the owner. 1940 and 1950, also include units sold or awaiting occupancy.

[3]Not available.

[4]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Does not include vacant mobile homes.

Sources: Forest Service estimates derived from data in the following sources: U.S. Department of Commerce, Bureau of the Census. *Historical statistics of the United States, colonial times to 1957.* 1960; *1970 census of housing.* HC(VI)-1. 1971. 1977—Estimate based upon U.S. Department of Commerce, Bureau of the Census. *Curr. Housing Reps.* Ser. H-111-77-S. 1978.

Projections: U.S. Department of Agriculture, Forest Service.

more like conventional units as discussed earlier.

Structural and architectural characteristics.—In addition to changes in house size, wood use per unit has been strongly affected by shifts in architectural and structural characteristics. For example, the proportion of new, single-family houses built with garages has grown from about 50 percent in 1950 to 74 percent in 1979—over four-fifths of which could accommodate two or more cars.[5] A continuation of this rising trend in the future seems unlikely because of increasing gasoline costs, changes in household size, and the already high level of this type of construction.

Increases in average wood products use per unit have also come from growth in the percentage of new one-family units using wood products as the principal exterior siding material, particularly during the 1970's,[6] and the increasing number of houses that have been built with wooden decks. This latter trend has moderated to some extent the losses due to the virtual disappearance of porches, once a feature of nearly all one-family houses.

One of the most important factors tending to reduce timber products use has been the substantial increase in the proportion of one-family houses built on concrete slab foundations, a type of construction that markedly lowers average wood products use because of the elimination of the wood-joist floor system. Between 1956 and 1970, the proportion of single-family houses constructed with concrete slab floor systems rose from 16 to 36 percent, with a further climb to 39 percent in 1979.[7] Construction of houses on slab foundations seems likely to continue at higher levels than in the past with expected population shifts to the southern and southwestern sections of the Nation, where slab construction is used in a large proportion of new single-family houses.

Two slowly growing construction innovations which, if more widely accepted, could moderate losses in timber products due to slab construction are the all-weather wood foundation and the underfloor plenum system. The former uses substantial amounts of lumber and plywood instead of concrete or block for basement construction.[8] The plenum system, which utilizes a wood floor system, can be cost competitive with and provide greater comfort and energy efficiency than traditional slab construction.[9]

Another change affecting timber products use has been the steady growth in the importance of two-story houses. In 1956, less than 10 percent of new one-family houses had two stories; by 1979, the proportion had reached 31 percent.[10] This type of construction reduces the roof area required to cover a given floor area, thereby lowering total wood products use and construction cost per square foot of floor area. In addition, two-story construction permits enlarging house size without in-

[5] *Ibid.*

[6] U.S. Department of Labor, Bureau of Labor Statistics. New housing and its materials, 1940–56. Bull. 1231, Govt. Printing Off., Washington, D.C., 1968; U.S. Department of Commerce, Bureau of the Census. *Op. cit.*

[7] *Ibid.*

[8] Dost, W. A. All weather wood foundation—a truly new market for wood. Forest Prod. J. 27(11):17–18. 1977; American Plywood Association. The all-weather wood foundation: why, what and how. Tacoma, Wash. 35 p. 1976.

[9] Countryman, David. Plen-wood—an improved wood floor system. Forest Prod. J. 29(6):29–33. 1979.

[10] U.S. Department of Labor, Bureau of Labor Statistics. *Op. cit.;* U.S. Department of Commerce, Bureau of the Census. *Op. cit.*

Table 3.5—*Housing unit replacements in the United States, specified periods 1920–77, with projections to 2030*

Period	Housing unit inventory[1]	Replacements: Total Number[1]	Replacements: Total Rate	Replacements: Net[1,2]	Replacements: Other[1,3]
	Thousands	*Thousands*	*Percent*	*Thousands*	*Thousands*
1920–29	28,614	115	0.40	8	107
1930–39	34,958	105	.30	−108	213
1940–49	41,731	210	.50	−72	282
1950–59	52,302	453	.87	267	186
1960–69	63,550	691	1.09	591	100
1970–77	75,500	515	.68	415	100
Low projections[4]					
1980–89	94,490	850	.90	750	100
1990–99	108,420	1,010	.93	910	100
2000–09	117,550	1,080	.92	980	100
2010–19	128,660	1,150	.89	1,050	100
2020–29	135,280	1,190	.88	1,090	100
Medium projections[4]					
1980–89	95,000	860	.91	760	100
1990–99	109,650	1,070	.98	970	100
2000–09	120,780	1,180	.98	1,080	100
2010–19	132,330	1,260	.95	1,160	100
2020–29	140,630	1,320	.94	1,220	100
High projections[4]					
1980–89	95,420	920	.96	820	100
1990–99	110,370	1,160	1.05	1,060	100
2000–09	124,130	1,280	1.03	1,180	100
2010–19	138,180	1,400	1.01	1,300	100
2020–29	147,940	1,480	1.00	1,380	100

[1]Average annual number for the period indicated.
[2]Includes replacement by new unit construction of conventional units and of mobile homes used as primary residences.
[3]Includes units added by means other than new unit construction (i.e., conversion of one unit to two or more units, conversion of nonresidential space to housing units, occupation of mobile homes formerly vacant and not counted in inventory totals, etc.).
[4]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Sources: Housing unit inventory: 1920–77—Forest Service estimates derived from data in tables 3.1 and 3.5.
Replacements: 1920–49—Forest Service estimates derived from demolition data published by U.S. Department of Commerce, Bureau of the Census. *Historical statistics of the United States, colonial times to 1957*. 1960. 1950–59—*United States census of housing, 1960*. vol. IV, Pt. 1-A. 1962. 1960–77—Forest Service estimates derived from housing start vacancy change and housing inventory data.

Projections: U.S. Department of Agriculture, Forest Service.

creasing the size of the building lot, a factor that should become increasingly important in the future with prospective rising land values.

Rising land costs along with restrictions on growth also apparently have resulted in somewhat smaller lot sizes and increased construction of attached single-family units such as townhouses and cluster houses. Such units are usually characterized by having at least one common wall (frequently of masonry construction) with consequent savings in exterior wall framing, sheathing, and siding. These types of units will likely continue as an important component of the total single-family housing market.

Evolution of construction methods toward the greater use of prefabricated housing components and modular housing units has tended to lower average unit use for some wood products, particularly lumber, primarily through reduction of waste and improved design. Wood roof trusses are perhaps the most widely used factory prefabricated structural component. However, floor trusses, prefabricated beams and lintels, exterior and interior wall panels, and roof and floor panels have been utilized in onsite construction of both single- and multifamily housing units. Other building components, such as doors, windows, and cabinets, are almost universally factory fabricated for onsite use. Excluding mobile homes, factory-finished modular, panelized, or precut complete housing units account for a relatively small proportion (less than 7 percent in 1976) of the total housing units produced.[11]

This trend toward use of prefabricated housing components and some increase in factory fabrication is expected to continue through the projection period, although problems of building codes, consumer tastes, transportation costs, and fragmentation of the building industry may act as constraints on a major shift to industrialized housing.

In conventional onsite construction, more efficient use of wood, such as wider spacing of studs and other structural members, has tended to bring about somewhat lower use of timber products per unit. There are also opportunities for additional savings in use of materials by changes in design and more realistic specifications of wood building components based on stress testing and other performance criteria.

Materials substitution.—The rising trends in use of plywood and other wood-based panel products per housing unit in the 1950's, 1960's, and 1970's largely reflected the substitution of these materials for lumber in such components as sheathing and subflooring. Through the early 1970's, plywood showed the largest growth. For example, between 1959 and 1972, the proportion of new one-family units constructed with plywood roof sheathing rose from 50 to 91 percent.[12] Since 1972, however, plywood use has dropped to 85 percent, largely due to lumber's resurgence as a substrate for shingles. In addition, new panel products, such as structural flakeboard and waferboard, have been introduced. These products, which are substitutes for plywood sheathing and similar applications, have had widespread acceptance in Canada. Use in the U.S.

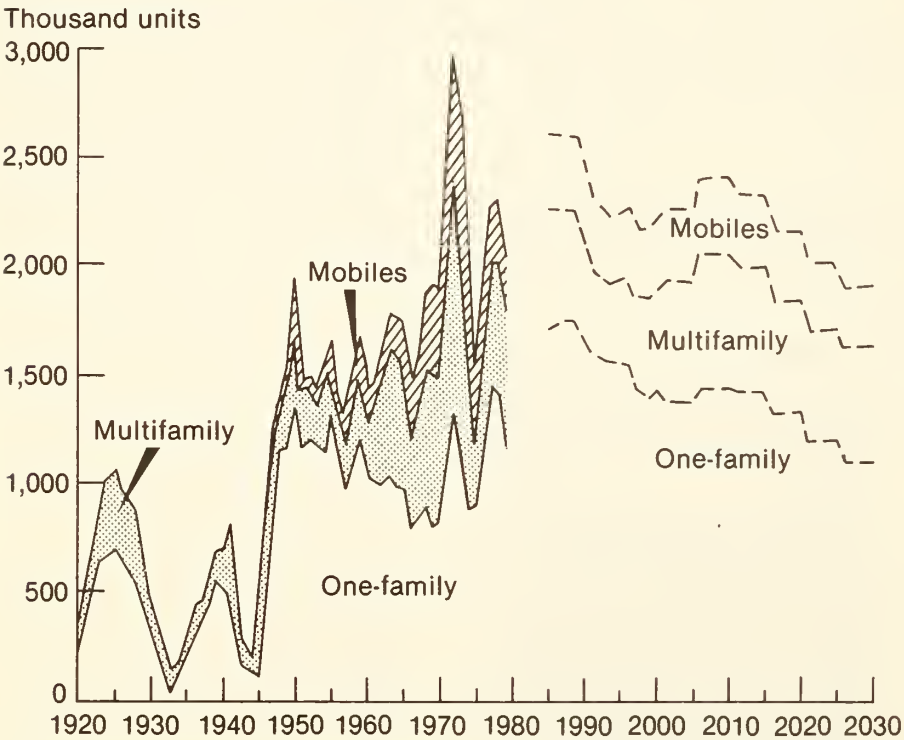
[11] Carney, Michael J. Softwood plywood used in new residential construction—1976. Market Res. Rep. R38. American Plywood Association, Tacoma, Washington. 45 p. 1977.

[12] Phelps, Robert B. Wood products used in single-family houses inspected by the Federal Housing Administration. 1959, 1962, and 1968. U.S. Dep. Agric., Stat. Bull. 452. 29 p. 1970; Carney, Michael J. *Op. cit.*

Evolution of housing construction methods toward the greater use of prefabricated and modular units has tended to lower average unit use of timber products through reduction of waste and improved design.

Figure 3.4

New Housing Unit Production by Type of Unit, 1920-79, with Projections to 2030



housing industry is rising and further substantial growth is likely.[13]

Composite veneer-particleboard products have also been developed and used in panel form as a substitute for conventional plywood and as framing to be used in lieu of sawn studs, joists, and beams. Composite panels have been produced commercially and, along with composite framing members, have been used in the construction of several demonstration houses. Growth of composite panel markets appears most likely at the present time.[14] However, general acceptance of both panels and framing and their ultimate widespread use will depend on their ability to compete economically and institutionally with the solid wood products that they are designed to replace.

Nonwood materials, such as aluminum, steel, plastics and masonry products, also compete with wood in many residential construction uses. Wood products have been displaced in a number of applications by metal siding, by plastic trim, and by nonwood flooring materials. For example, substitution of carpeting for oak flooring, either on a concrete slab floor or over particleboard underlayment, was an important factor in the decline of wood use—particularly hardwood lumber use—in the late 1960's and early 1970's.

Aluminum and steel have been used as alternative framing materials in light-frame construction. With the price relationships existing in early 1973, aluminum-framed exterior walls were less expensive than those framed with lumber.[15] However, since that time, aluminum prices have increased sharply and aluminum framing is not likely to be an economically competitive material for wood in the foreseeable future. Steel framing has been used in construction of apartment buildings; but, in general, its use has been limited in single-family construction, even though at times in the 1970's its in-place cost was less than for wood in

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[13] Dickerhoff, H. E. and T. C. Marcin. Factors influencing market potential for structural flakeboard. *In* Structural flakeboard from forest residues. U.S. Dep. Agric., Forest Serv., Gen. Tech. Rep. WO-5. 1978.

[14] Anderson, Robert G. Regional production and distribution patterns of the softwood plywood industry. Econ. Rep. E27, American Plywood Association, Tacoma, Washington. 31 p. July 1979.

[15] Wright, Maurice G. and Gerald A. Koenigshof. Comparative in-place cost between wood and aluminum residential floor and wall framing. U.S. Dep. Agric., Forest Serv., Res. Pap. WO-29. 62 p. June 1975.

some applications.[16] If lumber prices increase substantially faster than those for steel in the future, then steel framing may attain a cost advantage, which could induce its substitution for wood.

Projected timber products use factors.—The projections of lumber, plywood, and other timber products used per housing unit shown in table 3.7 have been based on the estimates of average housing unit size and a judgment evaluation of the probable future effects of the various factors discussed above.

It has been assumed that with the relative price relationships of the base period continuing (i.e., base level price trends), total use of timber products per square foot of floor area would decline in both one-family and multifamily units over the projection period. On the other hand, use of all products per square foot in mobile homes is expected to rise moderately as they become larger and more like conventional units.

Lumber use per square foot in one-family units dropped from about 8.5 board feet per square foot in 1962 to slightly over 6.8 board feet in 1976. As shown in the tabulation below, further moderate declines are projected with overall use falling to 6.0 board feet per square foot in 2030.

Plywood use per square foot also declines; however, combined hardboard, insulating board, and particleboard use increases. Most of the rise is expected to come from increased substitution of structural panel products such as waferboard and composite board for structural plywood. Total panel products use rises from 4.75 square feet per square foot of floor area in 1976 to 5.16 square feet in 2030.

Timber products use per square foot of floor area in multifamily units is expected to follow similar trends. Use per square foot of most timber products in mobile homes, however, is expected to show some increase with the types of units produced changing as discussed earlier.

Substantial volumes of timber products are used in the upkeep and improvement of existing housing units. This use is likely to become increasingly important in the future as the housing inventory grows.

Projected Demand for Timber Products in New Housing. Total consumption of lumber in new residential construction amounted to an estimated 16.2 billion board feet in 1976 (table 3.8). This was much above consumption in 1962 and 1970, but much below the peak level of 21.7 billion board feet reached in 1972 and the 21.4 billion consumed in 1978.

The medium projection of lumber demand—derived from the medium projection of demand for housing and the wood use factors shown in table 3.7—continues up in the 1980's to 23.3 billion board feet in 1990. In response to changing housing demand, total lumber use drops in the 1990's, moves up again in the decade after 2000, and declines thereafter to 17.9 billion board feet in 2030.

Consumption of plywood in new housing in 1976, an estimated 8.3 billion square feet, was about double the 1962 total, but below the 10.8 billion square feet consumed in 1978. The medium projection of plywood demand, like that for lumber, peaks in 1990, and with some fluctuation, declines through the remainder of the projection period to 8.9 billion board feet in 2030.

Combined hardboard, insulating board, and particleboard consumption totaled 2.6 billion square feet (½-inch basis) in 1976, up about 58 percent from total use in 1962. Because continued market penetration for these products is assumed, medium total demand for board peaks (at 5.8 billion square feet) in 2010, somewhat later than for lumber and plywood. After 2010, board products consumption also declines, reaching 4.9 billion square feet in 2030, about 85 percent above total use in 1976.

Year	*Floor area (square feet)*	*Lumber (board feet)*	*All panel products (square feet, ⅜-inch basis)*	*Plywood (square feet, ⅜-inch basis)*	*Board[17] (square feet, ½-inch equivalent)*	*All timber products[18] (board feet equivalent)*
1962......	1,355	8.46	---	2.28	---	---
1976......	1,700	6.82	4.75	3.42	1.00	10.39
			Projections			
1990......	1,850	6.34	4.95	3.18	1.33	10.50
2000......	1,950	6.19	5.04	3.06	1.49	9.97
2010......	1,975	6.09	5.08	3.00	1.52	9.90
2020......	1,990	6.03	5.13	2.96	1.63	9.88
2030......	2,000	6.00	5.16	2.94	1.66	9.87

[17]Hardboard, insulating board, and particleboard (including waferboard, flakeboard, composite board, and medium density fiberboard).

[18]Board feet of lumber plus square feet (½-inch basis) of panel products.

Demand for Timber Products in Residential Upkeep and Improvements

In addition to those products used in construction of new residential units,

[16] Koenigshof, Gerald A. Comparative in-place cost between wood and steel residential floor and wall framing. U.S. Dep. Agric., Forest Serv., Res. Pap. WO-22. 56 p. June 1974.

Table 3.6—*Average annual production of new housing units in the United States, by type of unit, specified periods 1920–77, with projections to 2030*

(Thousand units)

Period	Total	Conventional units			Mobiles		
		Total	One-family	Multi-family	Total	Used as primary residences	Not used as primary residences
1920–29	803	803	527	276	...	...	..
1930–39	365	365	301	64	...	...	..
1940–49	809	780	641	139	29	...	..
1950–59	1,522	1,460	1,209	251	63	41	22
1960–69	1,648	1,433	929	514	205	164	41
1970–77	2,145	1,757	1,102	655	388	310	78
Low projections[1]							
1980–89	2,490	2,160	1,620	540	330	260	70
1990–99	2,080	1,800	1,460	340	280	220	60
2000–09	1,970	1,680	1,260	420	290	230	60
2010–19	2,060	1,770	1,300	470	290	230	60
2020–29	1,720	1,470	1,070	400	250	200	50
Medium projections[1]							
1980–89	2,590	2,250	1,680	570	340	270	70
1990–99	2,240	1,930	1,540	390	310	250	60
2000–09	2,300	1,960	1,410	550	340	270	70
2010–19	2,270	1,930	1,390	540	340	270	70
2020–29	1,980	1,680	1,180	500	300	240	60
High projections[1]							
1980–89	2,700	2,340	1,740	600	360	290	70
1990–99	2,410	2,070	1,610	460	340	270	70
2000–09	2,760	2,350	1,610	740	410	330	80
2010–19	2,550	2,160	1,510	650	390	310	80
2020–29	2,450	2,070	1,370	700	380	300	80

[1]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: Housing starts: 1920–49 and 1960–62—Forest Service estimates derived from data in the following sources: U.S. Department of Commerce, Bureau of the Census. *Housing construction statistics*, 1889 to 1964. 1966. *1950 census of housing*. vol. I, Pt. 2. 1953. U.S. Department of Labor, Bureau of Labor Statistics, *Nonfarm housing starts, 1889–1958*. Bull. 1260. 1959. U.S. Department of Commerce, Bureau of the Census. 1950–59—*United States census of housing, 1960*. vol. IV, Pt. 1-A. 1962. 1963–69—*Housing starts*. Cons. Reps. Ser. C20-71-6. 1971; 1970–77—*Housing starts*. Cons. Reps. Ser. C20-78-4. 1978

Total mobile homes: 1940–49—Forest Service estimates derived from data in U.S. Department of Commerce, Bureau of the Census. *1950 census of housing*. vol. I, Pt. 1. 1953. 1950–59—Forest Service estimates derived from data in U.S. Department of Commerce, Business and Defense Services Administration. Construction Review. 7(3), 1961; Construction Review. 12(8), 1966. *Mobile home/Recreational dealer magazine market study, 1967–1968*. 1969. 1960–63—U.S. Department of Commerce, Business and Defense Services Administration. Construction Review. 11(9). 1975. 1964-69—Bureau of Census. *Housing starts*. Cons. Reps. Ser. C20-71-6. 1971; 1970–77—*Housing starts*. Cons. Reps. Ser. C20-78-4. 1978.

Mobiles used as primary residences: Forest Service estimates derived from data published by U.S. Department of Commerce, Bureau of the Census. *United States census of housing, 1960*. vol. IV, Pt. 1-A. 1962.

Projections: U.S. Department of Agriculture, Forest Service.

substantial volumes of timber products are used annually for the upkeep and improvement of units in the existing housing inventory. This market is likely to become increasingly important in the future as the Nation's housing stock grows.

Expenditures for Residential Upkeep and Improvements. Expenditures for residential upkeep and improvements, which generally fluctuated between $15.5 and $17.0 billion (measured in 1972 dollars) annually in the 1960's, increased some 24 percent between 1970 and 1976, reaching $20.6 billion (table 3.9). For purposes of this study, it was assumed that in the projection period expenditures would grow at about the same rate as the number of occupied housing units. Under this assumption, projected annual expenditures rise to about $29.4 billion (medium projection) in 2000 with a further increase to $36.3 billion in 2030.

Timber Products Use and Projected Demand. Based on an analysis of trends in housing use since 1970, lumber consumption per thousand dollars of expenditure for upkeep and improvements of residential structures is estimated at 280 board feet in 1976, a drop of 5 board feet from use in 1970 (table 3.9). Both plywood and combined hardboard, insulating board, and particleboard use per thousand dollars are estimated to have increased during the same period.

It was assumed that future lumber use per dollar would decline at about the same rate as per square foot use in new single-family construction. With the projected increases in expenditures discussed above, total lumber demand rises from 5.7 billion board feet in 1976 to about 7.8 billion (medium projection) by 2000 and to 9.1 billion board feet in 2030 (table 3.10).

Plywood use per thousand dollars of expenditure—estimated at 165 square feet in 1976—is assumed to slowly decline to 150 square feet in 2010 and remain constant thereafter. Associated total demand rises to 4.6 billion square feet (3/8-inch basis) (medium projection) in 2000 and to over 5.4 billion in 2030, about 63 percent above the level of use in 1976.

Combined hardboard, insulating board, and particleboard use averaged about 80 square feet per thousand dollars of expenditure in 1976 and is assumed to increase to 130 square feet by 2030. Given this average use and projected expenditures, the medium projection of demand for these products in 2030 is 4.7 billion square feet, about 2.9 times consumption in 1976.

Demand for Timber Products in New Nonresidential Construction

Construction of new nonresidential buildings and other structures is another important market for timber products, accounting for about 10 percent of the lumber and plywood and substantial volumes of the hardboard, insulating board, and particleboard consumed in 1976. For purposes of this

Table 3.7—*Timber products used per new housing unit in the United States, by product and type of unit, 1962, 1970, and 1976, with projections (base level price trends) to 2030*[1]

Product and type of unit	1962	1970	1976	Projections 1990	2000	2010	2020	2030
LUMBER								
(Board feet)								
One-family	11,470	11,100	11,595	11,730	12,070	12,030	12,000	12,000
Multifamily	4,710	3,835	5,510	5,380	5,340	5,310	5,290	5,280
Mobile homes	1,510	1,680	2,610	4,270	5,240	5,820	6,115	6,300
PLYWOOD								
(Square feet, ⅜-inch basis)								
One-family	3,085	5,520	5,815	5,880	5,970	5,930	5,890	5,880
Multifamily	1,800	1,970	2,930	2,910	2,910	2,900	2,900	2,910
Mobile homes	1,840	1,300	1,610	2,220	2,515	2,740	2,865	2,940
BOARD[2]								
(Square feet, ½-inch basis)								
One-family	.....	1,605	1,695	2,455	2,895	3,080	3,240	3,330
Multifamily	.....	175	655	845	940	1,005	1,045	1,055
Mobile homes	.....	1,590	1,635	2,230	2,180	2,150	2,115	2,080

[1]Includes both softwoods and hardwoods. Includes allowance for on-site and manufacturing waste.
[2]Hardboard, insulating board, and particleboard (including waferboard, flakeboard, composite board, and medium-density fiberboard). See Appendix 1, table 1.5 for projections of demand by type of unit for these products.

analysis, nonresidential construction—which is composed of a wide variety of building and nonbuilding projects—has been divided into five classes: (1) Commercial buildings (private offices, stores, restaurants, warehouses, etc.); (2) other buildings (public and private nonhousekeeping, industrial, educational, religious, hospital, and institutional buildings); (3) utilities, water, and sewer systems; (4) highways; and (5) all other (military facilities, conservation and development projects, railroad construction except track construction, and construction not included in other categories). Because of the diverse nature of nonresidential construction, the only common unit of measure available for analysis is expenditures in the form of the value of construction put in place.

Nonresidential Construction Expenditures. Total nonresidential construction expenditures (1972 dollars), though fluctuating somewhat in response to changing economic conditions, increased nearly fivefold between 1920 and 1968 (table 3.11, fig. 3.5). Expenditures were up for each of the classes of construction during this period, with the increases varying between three and five times for most. Highway construction expenditures showed a somewhat larger rise, reflecting the Federal Aid Highway Act of 1956, which authorized the interstate highway system.

Since 1968, expenditures for construction of nonhousekeeping residential buildings (hotels, motels, and dormitories), educational buildings, religious buildings, highways, industrial buildings and water supply facilities have dropped somewhat. In contrast, expenditures for hospitals, farm service buildings, sewer systems, and other public utilities increased. The result of these diverse trends was a decline in total expenditures through 1976, with a sharp rebound in 1978 and 1979. Per capita expenditures followed the same general trends in total and by construction class. (Append. 1, table 1.6.)

Projections based on past relationships, and the assumed increases in the gross national product discussed in Chapter 2, show a continuing rise in expenditures for new nonresidential construction through the 1990-2030 period, but at a declining rate for most classes. The projected rates are smallest for highways and largest for utilities and commercial buildings. The relatively low rate of growth for highways through the projection period is based on the expectation that the large increases in expenditures in the late 1950's and 1960's associated with the funding of the interstate highway system will not be repeated. The rate of growth in expenditures is not expected to decline appreciably, however, since the highways construction class also includes streets, and some expansion will be necessary to accommodate projected growth in housing and other development. The larger rates of growth for buildings and utilities are based on the expectations that these types of construction will continue at relatively higher levels in order to maintain services to a growing population, develop alternate means of energy generation and transmission, construct buildings that better conserve increasingly scarce energy and other resources, and at the same time, maintain and improve the environment.

Although the rates of growth for all of the classes of construction are expected to decline in the mid-1970's to 2030 period, some increase in expenditures is projected for each class, ranging from about two times for highways to nearly four times for commercial buildings. Per capita expenditures (medium projection) about double for

Table 3.8—*Timber products used in new housing in the United States, by product, 1962, 1970, and 1976, with projections of demand (base level price trends) to 2030*[1]

Year	Lumber	Plywood (⅜-inch basis)	Board[2] (½-inch basis)
	Million board feet	*Million square feet*	*Million square feet*
1962	13,940	4,180	1,660
1970	12,270	6,330	2,070
1976	16,240	8,285	2,630
Low projections[3]			
1990	21,845	11,060	4,900
2000	18,725	9,325	4,660
2010	19,800	9,855	5,120
2020	19,580	9,705	5,260
2030	15,645	7,755	4,270
Medium projections[3]			
1990	23,345	11,825	5,200
2000	21,320	10,645	5,255
2010	22,540	11,235	5,790
2020	20,670	10,255	5,535
2030	17,910	8,900	4,855
High projections[3]			
1990	24,715	12,520	5,500
2000	23,670	11,840	5,815
2010	26,580	13,270	6,805
2020	22,610	11,225	6,050
2030	23,065	11,495	6,210

[1]Includes both softwoods and hardwoods. Includes allowance for on-site and manufacturing waste.
[2]Hardboard, insulating board, and particleboard (including waferboard, flakeboard, composite board, and medium-density fiberboard).
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Table 3.9—*Expenditures and timber products used per thousand dollars of expenditure in residential upkeep and improvements in the United States, by product, 1970 and 1976, with projections (base level price trends) to 2030*

Year	Total expenditures	Use per thousand dollars of expenditures[1]		
		Lumber	Plywood (3/8-inch basis)	Board[2] (1/2-inch basis)
	Million 1972 dollars	*Board feet*	*Square feet*	*Square feet*
1970	16,580	285	150	65
1976	20,580	280	165	80
Low projections[3]				
1990	26,340	270	160	100
2000	28,990	265	155	105
2010	31,310	260	150	115
2020	33,620	255	150	120
2030	34,920	250	150	130
Medium projections[3]				
1990	26,530	270	160	100
2000	29,380	265	155	105
2010	32,250	260	150	115
2020	34,710	255	150	120
2030	36,320	250	150	130
High projections[3]				
1990	26,700	270	160	100
2000	29,790	265	155	105
2010	33,570	260	150	115
2020	36,300	255	150	120
2030	38,720	250	150	130

[1]Includes both hardwoods and softwoods. Includes allowance for on-site and manufacturing waste.
[2]Includes hardboard, insulating board, and particleboard (including waferboard, flakeboard, composite board, and medium-density fiberboard).
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Sources: Expenditures: U.S. Department of Commerce, Bureau of the Census. 1970—*Residential alterations and repairs.* C50-67-A, Pt. 1. 1968, and C50-77-A. 1971. 1976—*Residential alterations and repairs.* C50-77-Q4, and C50-77-A. 1978. Timber products use: U.S. Department of Agriculture, Forest Service.

Projections: U.S. Department of Agriculture, Forest Service.

all classes combined (Append. 1, table 1.6.)

Total projected expenditures for new nonresidential construction rise from about $64 billion (1972 dollars) in the mid-1970's to $166 billion (medium projection) in 2030. At this volume, expenditures compose about 3 percent of projected gross national product in 2030, down from a little over 5 percent in the mid-1970's. This is a continuation of an existing declining trend, and is consistent with estimates that services will likely compose a larger share of total gross national product in the years ahead.

Timber Products Use in New Nonresidential Construction. Trends in the use of the various timber products in new nonresidential construction have differed somewhat in recent years (table 3.12; Append. 1, tables 1.7-1.9). For example, between 1962 and 1973, estimated consumption of lumber rose from 3.3 billion to 3.7 billion board feet and then declined to 3.0 billion in 1976 as construction expenditures dropped. Plywood and combined hardboard, insulating board, and particleboard use, which totaled 1.8 billion square feet (3/8-inch basis) and 0.8 billion square feet (1/2-inch basis), respectively, in 1976, followed the same trends as lumber; however, the declines between 1973 and 1976 were somewhat smaller.

Nearly two-thirds of the lumber and 60 percent of the plywood consumed in nonresidential construction in the mid-1970's were used in the construction of buildings. Most of the lumber used in buildings went into the structure as rafters, joists, decking, and glue-laminated arches and beams.[19] The second most important use was for concrete forming or other facilitating purposes such as security fencing and temporary shoring. In contrast, concrete forming and other facilitating purposes were the predominant uses of

[19] Reid, William H. Wood products used in the construction of nonresidential and nonhousekeeping buildings—United States, 1961, 1969, and 1973. U.S. Dep. Agric., Stat. Bull. 563. 36 p. May 1977.

Table 3.10—***Timber products used in residential upkeep and improvements in the United States, by product, 1970 and 1976, with projections of demand (base level price trends) to 2030***[1]

Year	Lumber	Plywood (3/8-inch basis)	Board[2] (1/2-inch basis)
	Million board feet	*Million square feet*	*Million square feet*
1970	4,690	2,510	1,060
1976	5,690	3,350	1,620
Low projections[3]			
1990	7,110	4,160	2,630
2000	7,680	4,490	3,040
2010	8,140	4,760	3,600
2020	8,570	5,080	4,030
2030	8,730	5,240	4,540
Medium projections[3]			
1990	7,160	4,190	2,650
2000	7,790	4,550	3,090
2010	8,390	4,900	3,710
2020	8,850	5,240	4,160
2030	9,080	5,450	4,720
High projections[3]			
1990	7,210	4,220	2,670
2000	7,900	4,620	3,130
2010	8,730	5,100	3,860
2020	9,260	5,480	4,360
2030	9,680	5,810	5,030

[1]Includes both hardwoods and softwoods. Includes allowances for on-site and manufacturing waste.
[2]Hardboard, insulating board, and particleboard (including waferboard, flakeboard, composite board, and medium-density fiberboard).
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Sources: See table 3.9.

Projections: U.S. Department of Agriculture, Forest Service.

Table 3.11—*Expenditures for new nonresidential construction in the United States, by construction class, specified years 1920–79, with projections to 2030*

Year	All classes		Buildings				Utilities[3]		Highways		All other[4]	
			Commercial[1]		Other[2]							
	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change
	Billion 1972 dollars	*Percent*	*Billion 1972 dollars*	*Percent*	*Billion 1972 dollars*	*Percent*	*Billion 1972 dollars*	*Percent*	*Billion 1972 dollars*	*Percent*	*Billion 1972 dollars*	*Percent*
1920	15.4	.....	2.4	.....	7.4	.....	3.1	.....	1.3	.....	1.2	.....
1925	24.6	9.8	4.3	12.4	9.8	5.8	6.5	16.0	2.7	15.7	1.3	1.6
1930	28.1	2.7	4.0	−1.4	9.7	−.2	7.8	3.7	4.7	11.7	1.9	7.9
1935	13.3	−13.9	1.2	−21.4	3.5	−18.4	2.5	−20.4	2.7	−10.5	3.4	12.3
1940	20.9	9.5	1.7	7.2	6.1	11.8	4.5	12.5	4.5	10.8	4.1	3.8
1945	14.6	−6.9	.7	−16.3	7.0	2.8	3.0	−7.8	1.0	−26.0	2.9	−6.7
1950	30.9	16.2	3.0	33.8	12.6	12.5	7.8	21.1	4.5	35.1	3.0	.7
1955	44.4	7.5	6.0	14.9	18.0	7.4	8.6	2.0	7.3	10.2	4.5	8.5
1960	52.8	3.5	7.0	3.1	21.0	3.1	9.1	1.1	9.6	5.6	6.1	6.3
1965	71.0	6.1	([5])	.....	([5])	.....	11.9	5.5	11.8	4.2	6.8	2.2
1970	72.7	.5	11.2	.....	27.8	.....	15.6	5.6	11.5	−.5	6.6	−.6
1971	71.6	−1.5	12.4	10.7	25.8	−7.2	15.5	−.6	11.5	0	6.4	−3.0
1972	70.8	−1.1	13.4	8.1	24.6	−4.7	16.0	3.2	10.4	−9.6	6.4	0
1973	74.2	4.8	14.3	6.7	26.4	7.3	17.1	6.9	9.9	−4.8	6.5	1.6
1974	68.9	−7.1	12.4	−13.3	24.8	−6.1	16.5	−3.5	8.7	−12.1	6.5	0
1975	62.3	−9.6	9.3	−25.0	22.9	−7.7	16.4	−.6	7.3	−16.1	6.4	−1.5
1976	60.3	−3.2	9.2	−1.1	21.2	−7.4	16.9	3.1	6.7	−8.2	6.3	−1.6
1977	60.7	.1	10.0	8.7	21.2	.0	16.9	0	6.2	−7.4	6.5	3.2
1978	65.6	8.1	11.2	12.0	23.1	9.0	18.7	10.7	5.8	−6.5	6.7	3.1
1979[6]	66.9	.2	12.9	15.2	23.5	.2	18.8	.1	5.4	−6.9	6.3	−6.0
Low projections[7]												
1990	95.7	[8]1.8	18.0	[8]2.6	33.1	[8]1.4	25.0	[8]2.7	11.3	[8]0.5	8.3	[8]1.2
2000	108.4	1.3	23.0	1.6	36.7	1.0	29.7	1.7	11.8	.4	9.0	.8
2010	121.3	1.1	24.4	1.4	40.4	1.0	34.4	1.5	12.3	.4	9.8	.8
2020	131.9	.8	27.1	1.1	43.4	.7	38.2	1.1	12.6	.2	10.5	.6
2030	144.1	.9	30.2	1.1	46.8	.8	42.7	1.1	13.1	.4	11.2	.7
Medium projections[7]												
1990	99.4	[8]2.1	18.9	[8]2.9	34.2	[8]1.7	26.4	[8]3.1	11.5	[8]0.6	8.5	[8]1.4
2000	115.4	1.5	22.9	2.0	38.7	1.2	32.2	2.0	12.0	.5	9.5	1.1
2010	132.5	1.4	27.2	1.7	43.6	1.2	38.5	1.8	12.7	.5	10.5	1.1
2020	147.8	1.1	31.1	1.3	47.9	.9	44.1	1.4	13.2	.4	11.5	.9
2030	165.7	1.2	35.7	1.3	53.0	1.0	50.6	1.4	13.8	.5	12.6	.9
High projections[7]												
1990	102.9	[8]2.3	19.8	[8]3.3	35.2	[8]1.9	27.7	[8]3.4	11.6	[8]0.6	8.7	[8]1.6
2000	123.0	1.8	24.9	2.3	40.9	1.5	35.0	2.4	12.3	.6	9.9	1.3
2010	145.1	1.7	30.4	2.0	47.1	1.4	43.1	2.1	13.1	.6	11.3	1.3
2020	166.1	1.4	35.8	1.6	53.1	1.2	50.8	1.7	13.9	.6	12.6	1.1
2030	190.9	1.4	42.1	1.6	60.1	1.2	59.9	1.7	14.7	.6	14.1	1.2

[1]Includes private commercial buildings such as offices, stores, warehouses, and restaurants.
[2]Includes public and private nonhousekeeping, industrial, educational, religious, hospital and institutional, farm service, and miscellaneous buildings.
[3]Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.
[4]Includes military facilities, conservation and development, railroad construction except track construction, and all other public and private construction not included in the other categories.
[5]Not available.
[6]Preliminary.
[7]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.
[8]Rates of change calculated from the following 1976 trend values: all classes, $74.6 billion; commercial buildings, $12.6 billion; other buildings, $27.1 billion; utilities, $17.3 billion; highways, $10.6 billion; and all other, $7.0 billion.

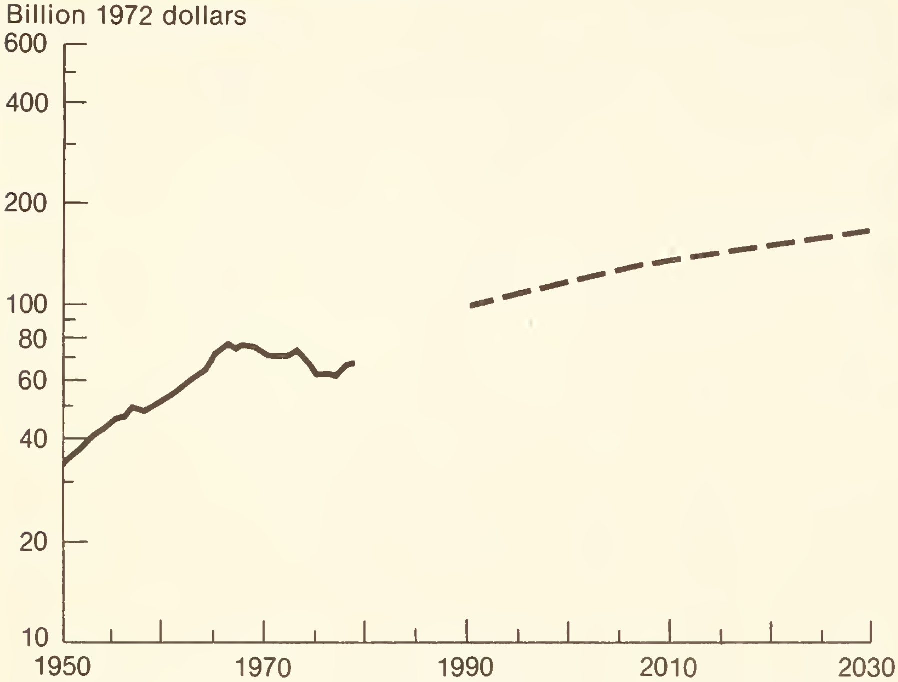
Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Business and Defense Services Administration. 1920–46—*Construction statistics, 1915–1974* (*Supp. to* Construction Review). 1966; Bureau of the Census. 1947–71—*Value of new construction put in place, 1947 to 1974*. Cons. Reps. Ser. C30-74. 1974; Industry and Trade Administration. 1972–76—Construction Review. 25(8). 1979; Bureau of the Census. 1977–79—*Value of new construction put in place*. Cons. Reps. Ser. C30-80-9. 1980.

Projections: U.S. Department of Agriculture, Forest Service.

Figure 3.5

Expenditures for New Nonresidential Construction, 1950–79, with Projections to 2030



The demand for timber products in railroad construction has been rising in the last decade or so, and further increases are expected.

plywood in buildings, and of both lumber and plywood in most other types of nonresidential construction. About 90 percent of the hardboard and particleboard was used for millwork, paneling, and partitions in buildings, while most of the insulating board was used in building roofs.

Timber Products Use Per Dollar of Construction Expenditure. The declines in total consumption of the various timber products in nonresidential construction between 1973 and 1976 were largely due to the fall-off in expenditures. Lumber was the only product to exhibit a decline in use per dollar of expenditure (1972 dollars) for all classes combined, as increases for buildings and "other" types of construction failed to offset declines in utilities and highways (Append. 1, table 1.7). Plywood use per dollar in utilities also dropped; however, board use rose in all classes (Append. 1, tables 1.8 and 1.9).

These trends in timber products use per dollar of expenditures reflect numerous complex technological and institutional forces, many of which are not easily identified or measured with the data available. In addition, many large nonresidential buildings and other projects are basically one-of-a-kind structures, differing markedly in design and materials use. Despite these limitations, some general trends can be identified. For example, much of the decline in lumber use per dollar of expenditure during the past two decades has come about because of such factors as increasing use of plywood and metal for concrete forming; substitution of metal studs, joists, and decking; rising use of precast and prestressed concrete beams and other structural members in lieu of onsite forming; and such innovations as slipform and tiltwall construction. The use of metal forming systems for concrete also tended to reduce plywood consumption per dollar. Restrictive codes and other building regulations on the use of wood products have also been important, as well as increased urbanization which has to some extent resulted in a tendency toward larger buildings and less use of wood products.

Countering these trends has been increased use of large structural wood framing members such as beams, trusses, and arches in some building types; improvement in the durability of some timber products (e.g., plastic-faced plywood for concrete forming); rising wood siding use on some small buildings; and increases in interior paneling. Changes in architectural styles, such as the revival of the mansard roof and colonial types of architecture, have also been important.

Projected Demand for Timber Products in New Nonresidential Construction. Based on the expectation that the various trends in timber products use by construction class will continue in future years—though at a somewhat slower rate—and on the projected expenditures by construction class discussed earlier, lumber use per dollar (1972 dollars—base level price trends) for all construction types combined drops by about a fourth by 2030. This projected decline does not offset expected increases in expenditures, however, and as a result, projected lumber use rises to 6.2 billion board feet (medium projection) by 2030, an average annual increase of about 1.4 percent from use in 1976 (table 3.12). Projected plywood demand under these assumptions almost triples and demand for board rises nearly 4.5 times.

Demand for Timber Products in Railroad Construction

In 1976, nearly 1.5 billion board feet of lumber, about four-fifths in the form of ties, and 25 million square feet (⅜-inch basis) of plywood were used by the railroad industry in the construction of new track and the maintenance of existing track and rolling stock.[20]

[20] Substantial volumes of lumber and plywood are also used in the construction and maintenance of nonresidential structures used by railroads and in the manufacture of freight cars. Past consumption and projected demands for timber products in these uses are included in other sections of this chapter dealing with nonresidential construction and manufacturing.

Table 3.12—*Timber products used in new nonresidential construction in the United States, by product, 1962, 1970, 1973, and 1976, with projections of demand (base level price trends) to 2030*

Year	Lumber		Plywood (3/8-inch basis)		Board[1] (1/2-inch basis)	
	Total	Use per 1,000 dollars of expenditure[2]	Total	Use per 1,000 dollars of expenditure[2]	Total	Use per 1,000 dollars of expenditure[2]
	Million board feet	*Board feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1962	3,303.4	57.2	1,639.4	28.4	605.0	10.5
1970	3,528.4	48.5	1,889.3	26.0	785.0	10.8
1973	3,695.3	49.8	2,158.5	29.1	915.3	12.3
1976	3,000.6	49.7	1,824.5	30.3	821.5	13.6
			Low projections[3]			
1990	4,090	42.7	3,080	32.1	1,610	16.8
2000	4,420	40.7	3,610	33.3	2,060	19.0
2010	4,750	39.2	4,160	34.3	2,510	20.6
2020	5,060	38.4	4,570	34.6	2,850	21.6
2030	5,420	37.6	4,970	34.5	3,160	21.9
			Medium projections[3]			
1990	4,240	42.7	3,180	32.0	1,670	16.8
2000	4,700	40.7	3,810	33.0	2,190	19.0
2010	5,190	39.2	4,490	33.9	2,740	20.6
2020	5,670	38.4	5,050	34.2	3,190	21.6
2030	6,230	37.6	5,630	34.0	3,630	21.9
			High projections[3]			
1990	4,390	42.7	3,280	31.8	1,730	16.8
2000	5,010	40.7	4,020	32.7	2,330	19.0
2010	5,680	39.2	4,850	33.5	2,990	20.6
2020	6,370	38.4	5,610	33.8	3,590	21.6
2030	7,170	37.6	6,390	33.5	4,170	21.9

[1]Hardboard, insulating board, and particleboard (including waferboard, flakeboard, composite board, and medium-density fiberboard).
[2]1972 dollars. Use per 1,000 dollars of construction expenditure 1962–76 computed by Forest Service. (See table 3.11 for construction expenditures.)
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Source: Estimates based on Forest Service surveys.

Projections: U.S. Department of Agriculture, Forest Service.

Between the 1920's and the 1960's, the number of railway crossties used annually dropped from an average of about 96 million to less than 18 million (table 3.13). The downward trend in use reflected such factors as a major reduction in construction of new track, a drop in railroad track mileage, increased average life of ties resulting from use of wood preservatives, use of various devices to reduce mechanical wear and splitting of wood ties, use of welded track, and a shift to diesel locomotives with reduced track wear.

Since the early 1960's, when crosstie use dropped to less than 15 million, the long downward trend has reversed and, though fluctuating somewhat from year to year, the number consumed has been increasing. For example, average annual tie use in the 1976-79 period was 28.5 million, the largest number since the 1950's. This rise is expected to continue because of the growing need for improved track maintenance and trends toward heavier wheel loads and higher speed trains which reduce the service life. Prospective rising fuel costs for alternate forms of transportation also point to the likelihood that the railway system may be used more heavily than in the past.

In projecting future timber demand for ties, it has been assumed that penetration of this market by nonwood materials will be limited. Concrete crossties are used extensively in Japan and Europe and have been installed in track in scattered locations in Canada and in the United States. Currently, about 400 miles of line are being constructed with concrete ties in the Northeast under the Federal Railroad Administration's improvement program,[21] however, less than 0.5 percent of all ties in use in the United States are concrete.[22]

Early European experience with concrete ties showed them to be costly and unsafe for high-speed operations, and performance of concrete ties installed in U.S. railroads prior to 1970 was generally poor because of structural and fastener problems. However, experience with recently installed concrete ties has been much more favorable, and wood and concrete tie systems are both considered suitable for high-speed train operations and for use by both freight and passenger trains.[23]

Although apparently technically suitable, initial costs of installation (1977 price relationships and construction practices) and annualized costs for installation and replacement (based on an assumed, but as yet unproven, 50-year life) for concrete tie systems was more than for wood systems.[24] In addition, such factors as higher energy requirements for constructing concrete tie railway systems,[25] large capital investment necessary to build the manufacturing capacity to switch to concrete systems,[26] and the more serious impacts on the environment by concrete systems[27] all point toward the probability that an extensive switch from wood systems is not likely in the foreseeable future.

Demand for crossties has, therefore, been projected to rise to 31.1 million (medium level—base level price trends) by 1990 and to trend very slowly down to 30.7 million in 2020

[21] Anonymous. NE corridor improvement plan opens doors for concrete ties. Engineering News Record. 200(3):58. 1978.

[22] Howe, John P. Concrete crossties—a challenge to the wood tie industry. Forest Prod. J. 29(2):15–20. 1979.

[23] Josephson, H. R. An economic evaluation of the use of treated wood ties and concrete ties on U.S. railroads. The Railway Tie Association. St. Louis, Mo. 20 p. July 1, 1977.

[24] *Ibid.*

[25] Josephson, H. R. Energy requirements for wood and concrete ties. The Railway Tie Association. St. Louis, Mo. 9 p. June 28, 1977.

[26] Josephson, H. R. (July 1, 1977) *Op. cit.*

[27] Josephson, H. R. Economic, social, and conservation benefits from use of wood preservatives. American Wood Preservers Institute. McLean, Va. 67 p. October 1, 1979.

Table 3.13—*Railway mileage and wood ties used in the United States, 1920–79, with projections (base level price trends) to 2030*

Year	Mileage of track operated: Total	Mileage of track operated: Laid on crossties	Crossties per mile of track	Tie consumption[1]: Total volume	Crossties: Number	Crossties: Volume	Switch and bridge ties: Number	Switch and bridge ties: Volume
	Thousand miles	*Thousand miles*	*Number*	*Million board feet*	*Thousands*	*Million board feet*	*Thousands*	*Million board feet*
1920–29[2]	400.4	372.4	([3])	3,598	96,400	3,278	5,079	320
1930–39[2]	399.9	371.9	2,986	2,085	52,506	1,890	3,095	195
1940–49[2]	378.3	351.8	3,000	2,000	48,353	1,837	2,587	163
1950–59[2]	369.8	343.9	3,015	1,262	29,523	1,151	1,762	111
1960–69[2]	349.9	325.4	3,020	771	17,872	705	1,048	66
1970	340.0	316.2	3,030	898	20,840	834	1,016	64
1971	348.3	310.4	3,031	1,030	24,121	965	1,016	64
1972	344.4	304.8	3,032	1,014	23,733	949	1,032	65
1973	341.8	303.2	3,032	910	21,208	848	984	62
1974	340.8	302.8	3,032	970	22,535	901	1,095	69
1975	337.2	300.2	3,031	938	21,850	874	1,016	64
1976	325.3	299.4	3,033	1,220	28,748	1,150	1,111	70
1977	323.7	291.3	3,032	1,204	28,265	1,131	1,160	73
1978	329.8	296.8	3,032	1,226	28,821	1,153	1,160	73
1979[4]	323.4	291.1	3,033	1,202	28,228	1,129	1,158	73
Low projections[5]								
1990	323.0	293.0	3,035	1,200	28,010	1,120	1,250	80
2000	321.0	291.0	3,035	1,190	27,790	1,110	1,240	80
2010	320.0	290.0	3,035	1,190	27,700	1,110	1,240	80
2020	320.0	290.0	3,040	1,180	27,660	1,110	1,230	80
2030	320.0	290.0	3,040	1,180	27,660	1,110	1,230	80
Medium projections[5]								
1990	323.0	293.0	3,035	1,330	31,120	1,240	1,390	90
2000	321.0	291.0	3,035	1,320	30,880	1,230	1,380	90
2010	320.0	290.0	3,035	1,320	30,780	1,230	1,370	90
2020	320.0	290.0	3,040	1,320	30,730	1,230	1,370	90
2030	320.0	290.0	3,040	1,320	30,730	1,230	1,370	90
High projections[5]								
1990	323.0	293.0	3,035	1,470	34,240	1,370	1,530	100
2000	321.0	291.0	3,035	1,450	33,970	1,360	1,520	100
2010	320.0	290.0	3,035	1,450	33,860	1,350	1,510	100
2020	320.0	290.0	3,040	1,450	33,810	1,350	1,510	100
2030	320.0	290.0	3,040	1,450	33,810	1,350	1,510	100

[1]Includes ties for replacement and for new track.
[2]Data shown are annual averages for the decade.
[3]Not available.
[4]Preliminary.
[5]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data on tie consumption by class I railroads as reported by the ICC have been adjusted to include consumption by all railroads. Data may not add to totals because of rounding.

Sources: U.S. Interstate Commerce Commission, Bureau of Transport Economics and Statistics; 1920–53—*Statistics of railways in the United States.* Annual. 1954–76—*Transportation statistics in the United States.* Annual. 1977–79—U.S. Department of Agriculture, Forest Service.

Projections: U.S. Department of Agriculture, Forest Service.

and 2030. These volumes imply some increase in new track construction [28] (to about the level of the 1950's), a slightly larger number of crossties per mile of track, and an average tie life of 30 to 35 years. It also assumes that there will be no substantial reduction in the mileage of track operated.

Total timber products demand for both crossties and switch and bridge ties is projected to rise to 1.3 billion board feet by 1990 and remain at about that level through 2030.

In addition to ties, an estimated 250 million board feet of lumber and 50 million square feet (3/8-inch basis) of plywood were used annually for repair of railroad cars in industry-owned facilities. Such factors as growing numbers of freight cars, increasing size of cars, and the use of heavier decking will tend to increase demands for lumber and plywood in car repair. Changes in the types of cars, however, and use of nonwood materials appear likely to partially offset this trend. In view of these considerations, demand for lumber for car construction and repair within the railroad industry has been projected at 300 million board feet, and demand for plywood at 50 million square feet in all projection years.

Timber products are used to manufacture a wide variety of items such as furniture, tool handles, sporting goods, signs and displays, and truck and trailer bodies.

Demand for Timber Products in Manufacturing

The manufacture of a wide range of products such as furniture, sports equipment, games and toys, and agricultural implements accounted for about a tenth of the lumber and veneer and plywood and nearly 40 percent of the combined hardboard and particleboard usage in 1976.

For this analysis, manufactured goods have been divided into three groups: (1) Household furniture, (2) commercial and institutional furniture, and (3) other products.[29] Although this latter group accounts for a moderately large part of total manufacturing timber products consumption, use by the individual products is relatively small and, therefore, they have been combined.

In addition to the estimates presented in this section, substantial amounts of timber products are used in manufactured goods such as pallets, containers, prefabricated wooden buildings and structural members, mobile homes, millwork, and flooring. Information on consumption and projected demands for timber products in the manufacture of these items is included in other sections of this chapter dealing with housing, nonresidential construction, and shipping.

Timber Products Use in Manufacturing. Consumption of most timber products used in the manufacture of goods included in this section slowed appreciably or declined between 1970 and 1976, after showing substantial rises during the preceding decade (table 3.14).[30] The major exception was particleboard, with consumption reaching 1.5 billion square feet (3/4-inch basis) in 1976, up some 57 percent from 1970. In contrast, lumber consumption dropped to 4.3 billion board feet in 1976, about 0.4 billion below use in 1970. Veneer and plywood consumption also fell, reaching about 1.6 billion square feet (3/8-inch basis); however, unlike the other products, this was a continuation of the somewhat erratic downtrend since 1960. Hardboard use showed little change between 1970 and 1976, averaging about 1.4 billion square feet (1/8-inch basis) both years.

Household furniture manufacture is by far the largest industrial use of timber products. Although household furniture use of all the major products except particleboard dropped somewhat between 1970 and 1976, its manufacture in the latter year nevertheless accounted for 59 percent of the lumber, 47 percent of the hardboard, and 45 percent of the veneer and plywood used in all manufacturing. The proportion of total manufacturing consumption of particleboard (and medium density fiberboard) used in household furniture increased to about 63 percent. Particleboard use in the other product groups

[28] Including new lines, conversions of single-track to multiple-track road, passing tracks, sidings, and yard switching tracks.

[29] Includes sporting goods, musical instruments, boat-building and repair, toys and games, luggage and trunks, handles, wood pencils, morticians' goods, shoe and boot findings, wooden matches, commercial refrigeration, signs and displays, patterns and jigs, truck bodies and trailers, general machinery, agricultural implements, electrical equipment, and textile machinery supplies.

[30] The data for 1948, 1960, and 1965 shown in table 3.14 were obtained from Forest Service surveys of wood used in manufacturing industries. The 1970 and 1976 estimates were updated from 1965 primarily on the basis of changes in value of shipments and trends in wood use per dollar of shipments.

Table 3.14—*Timber products used in manufacturing in the United States, by product and commodity group, specified years 1948–76*

Year and commodity group	Lumber	Veneer and plywood (3/8-inch basis)	Hardboard (1/8-inch basis)	Particleboard[1] (3/4-inch basis)
	Million board feet	*Million square feet*	*Million square feet*	*Million square feet*
1948				
Household furniture	1,970	592	(2)	(2)
Commercial and institutional furniture	321	274	(2)	(2)
Other products[3]	1,633	260	(2)	(2)
Total	3,924	1,126	(2)	(2)
1960				
Household furniture	2,116	877	231	58
Commercial and institutional furniture	289	342	145	34
Other products[3]	1,460	603	384	14
Total	3,865	1,822	760	106
1965				
Household furniture	2,987	789	526	312
Commercial and institutional furniture	280	230	138	119
Other products[3]	1,342	543	471	45
Total	4,609	1,562	1,135	476
1970				
Household furniture	2,961	838	663	590
Commercial and institutional furniture	271	227	127	290
Other products[3]	1,438	591	571	80
Total	4,670	1,656	1,361	960
1976				
Household furniture	2,540	700	650	950
Commercial and institutional furniture	260	220	130	460
Other products[3]	1,500	630	600	100
Total	4,300	1,550	1,380	1,510

[1]Includes medium-density fiberboard.
[2]Not available.
[3]Includes all other manufactured products except pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring, and other similar goods included in the construction and shipping sections of this chapter.

Sources: U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2, 1951; 1960—*Wood used in manufacturing industries, 1960.* Stat. Bull. 353. 1965; 1965—*Wood used in manufacturing industries, 1965.* Stat. Bull. 440. 1969; 1970 and 1976—Based on value of shipments (table 3.15), and trends in timber products use per dollar of shipments (table 3.16).

Projections: U.S. Department of Agriculture, Forest Service.

listed above also increased between 1970 and 1976; however, consumption of the other timber products showed little significant change.

These recent trends reflect both differential growth in the production of the various manufactured products, and technological changes which have affected the kinds and amounts of materials used in them.

Shipments of Manufactured Products. The value of household furniture shipments (measured in constant 1972 dollars) grew steadily in the 2½ decades prior to 1974, increasing at an annual rate of about 3.6 percent (table 3.15). Per capita value of shipments also increased during this period, rising by 2.2 percent per year (Append. 1, table 1.10). In 1974 and 1975, as a result of worsened economic conditions, shipments dropped sharply before improving again in 1976-79.

Changes in the per capita value of household furniture shipments during recent years have been closely correlated with changes in per capita disposable personal income. Projections of the value of shipments of the household furniture industry based on this relationship, and on the population and income assumptions presented in Chapter 2, about double between 1976 and 2030 (medium projection—base level price trends).[31] Annual rates of growth show a substantial decline over the projection period from 6.0 percent in the early 1970's to 0.9 percent in the years after 2010.

Shipments of commercial and institutional furniture and of those goods included in the "other products" group followed the same general trends as household furniture in recent decades, although there were significant differences in the rates of growth (table 3.15). Despite such differences, there was a close relationship between changes in the value of shipments of each and gross national product.

Projections to 2030, based on these past relationships, show increases of about 2.8 times for commercial and institutional furniture and 2.5 times for those goods in the "other products" group (medium projection). As in the case of household furniture, the rates of increase in value of shipments drop significantly through 2010. After 2020, however, value of shipments of commercial and institutional furniture shows a reversal of this trend in response to the increasing rates of growth in gross national product (Chapter 2, table 2.1). Value of shipments of all manufactured goods rises to $1,732 billion in 2030 (fig. 3.6).

Timber Products Use Per Dollar of Shipments. There have been divergent trends in the use of lumber and other timber products per dollar of shipments of manufactured products in the past 15 years (table 3.16). Use of lumber and veneer and plywood dropped in all product groups, while an increase in hardboard use in household furniture was more than offset by declines in commercial and institutional furniture, and those goods included in other products (Append. 1, tables 1.11-1.13). Consumption of particleboard (including medium density fiberboard) increased substantially because of rapidly rising use in furniture (Append. 1, table 1.14).

Such changes reflect numerous technical and institutional shifts both within the industry and in their markets. For example, part of the decline in the use of lumber and plywood per dollar of shipments reflects inroads of alternative materials. Plastics became a particularly important substitute for wood in furniture manufacture in the late 1960's and early 1970's,[32] especially for the ornate, highly detailed parts used in the Spanish and Mediterranean styles, then most popular. In

[31] Calculated from the 1976 trend value of $7.3 billion, as noted in table 3.15.

[32] Clark, Edward L. Plastics and the future of the furniture industry in the United States. Forest Prod. J. 21(8):14–16. 1971.

Table 3.15—*Value of manufacturing shipments in the United States, by commodity group, specified years 1948–79, with projections to 2030*

Year	All products		Household furniture		Commercial and institutional furniture		Other products[1]	
	Value	Annual rate of change	Value	Annual rate of change	Value	Annual rate of change	Value	Annual rate of change
	Billion 1972 dollars	*Percent*	*Billion 1972 dollars*	*Percent*	*Billion 1972 dollars*	*Percent*	*Billion 1972 dollars*	*Percent*
1948	304.5	....	3.0	.....	0.7	.....	300.8	....
1950	326.3	3.5	3.4	6.5	.9	1.3	322.0	3.5
1955	421.6	5.3	4.2	4.3	1.3	7.6	416.1	5.3
1960	449.4	1.3	4.5	1.4	1.7	5.5	443.2	1.3
1965	589.0	5.6	5.8	5.2	2.3	6.2	580.9	5.6
1970	666.9	2.5	6.3	1.7	3.3	7.5	657.3	2.5
1971	679.9	1.9	6.8	7.9	3.3	0	669.8	1.9
1972	732.9	7.8	7.4	8.8	3.9	18.2	721.6	7.7
1973	771.6	5.3	7.5	1.4	3.9	0	760.2	5.3
1974	759.5	−1.6	6.4	−14.7	3.7	−5.1	749.4	−1.4
1975	698.4	−8.0	5.3	−17.2	3.2	−13.5	689.9	−7.9
1976	760.2	8.9	5.9	11.3	3.3	3.1	751.0	8.9
1977[2]	799.9	5.2	6.5	10.2	4.1	24.2	789.3	5.1
1978[2]	840.3	5.1	7.7	18.5	4.0	−4.9	828.6	5.0
1979[2]	916.8	9.1	8.4	9.1	4.4	10.0	904.0	9.1
				Low projections[3]				
1990	1,011.9	[4]1.6	8.7	[4]1.3	5.3	[4]2.6	997.9	[4]1.6
2000	1,132.7	1.1	9.6	1.0	6.2	1.6	1,116.9	1.1
2010	1,242.3	.9	10.5	.9	6.9	1.2	1,224.9	.9
2020	1,309.4	.5	11.0	.5	7.3	.6	1,291.1	.5
2030	1,381.8	.5	11.5	.5	7.9	.8	1,362.4	.5
				Medium projections[3]				
1990	1,061.1	[4]1.9	9.1	[4]1.6	5.7	[4]3.1	1,046.3	[4]1.9
2000	1,237.4	1.5	10.4	1.3	6.9	1.9	1,220.1	1.5
2010	1,416.6	1.4	11.8	1.3	8.1	1.6	1,396.7	1.4
2020	1,562.4	1.0	12.9	.9	9.0	1.1	1,540.5	1.0
2030	1,731.9	1.0	14.2	.9	10.2	1.3	1,707.5	1.0
				High projections[3]				
1990	1,111.8	[4]2.3	9.5	[4]1.9	6.0	[4]3.5	1,096.3	[4]2.3
2000	1,334.3	1.8	11.2	1.7	7.5	2.3	1,315.6	1.8
2010	1,571.4	1.6	13.0	1.5	9.1	2.0	1,549.3	1.6
2020	1,783.8	1.3	14.6	1.2	10.5	1.4	1,758.7	1.3
2030	2,031.9	1.3	16.5	1.2	12.2	1.5	2,003.3	1.3

[1]Includes all other manufactured products except pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring, and other similar goods included in the construction and shipping sections of this study.

[2]Preliminary.

[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

[4]Rates of change calculated from the following 1976 trend values: all products, $810.0 billion; household furniture, $7.3 billion; commercial and institutional furniture, $3.7 billion; and other products, $799.0 billion.

Note: Value of shipments in 1972 dollars derived by dividing value of shipments in current dollars by the producer price index of all manufactured products (1972=100). Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. 1948 and 1950—*Value of shipments of selected classes of products for the United States.* MAS-53 (final). 1955; 1955—*Value of shipments of selected classes of products for the United States.* MA-57-2. 1959; Bureau of Domestic Commerce. 1960–69—*Growth in shipments by classes of manufactured products.* 1971. Bureau of the Census. 1971–79—*General statistics for industry groups and industries.* MA-79 (AS)-1. 1980.

Projections: U.S. Department of Agriculture, Forest Service.

addition, there was a reported growing use of plastics for other furniture parts because of lower costs, greater freedom in design, superior dimensional stability, and resistance to damage. Use of plastics has continued since the early 1970's; however, its penetration of the furniture markets has apparently slowed somewhat. For example, use of plastic components and parts in the household furniture industry apparently declined between 1972 and 1977.[33] In addition to such technical factors as wood's ease of refinishing and repair, greater fracture resistance, and higher load bearing strength, the deep-seated preference for wood furniture by some consumers, the declining demands for Mediterranean and Spanish style furniture,[34] and the increasing popularity of "character-marked" woods may have been contributing factors.

For some other manufactured products—such as commercial and institutional furniture, boats, and toys—other materials such as fiberglass, reinforced plastics, or metals continue to be used because of their lower costs or preferred performance characteristics.

Particleboard and hardboard have also partially displaced lumber and plywood in some manufactured products, particularly furniture, where particleboard is used extensively for corestock, and hardboard is used for components such as backs and drawer bottoms in cabinets. The relatively recent development of medium density fiberboard, with its superior edge-working characteristics, compared with conventional particleboards, has provided the furniture industry with another growing substitute for lumber and plywood; particularly, in applications where its smoother surface permits, for example, printing of a wood grain or other pattern directly on the surface thus eliminating the need for a veneer or paper overlay.[35]

Part of the decline in the use of lumber, plywood, and hardboard per

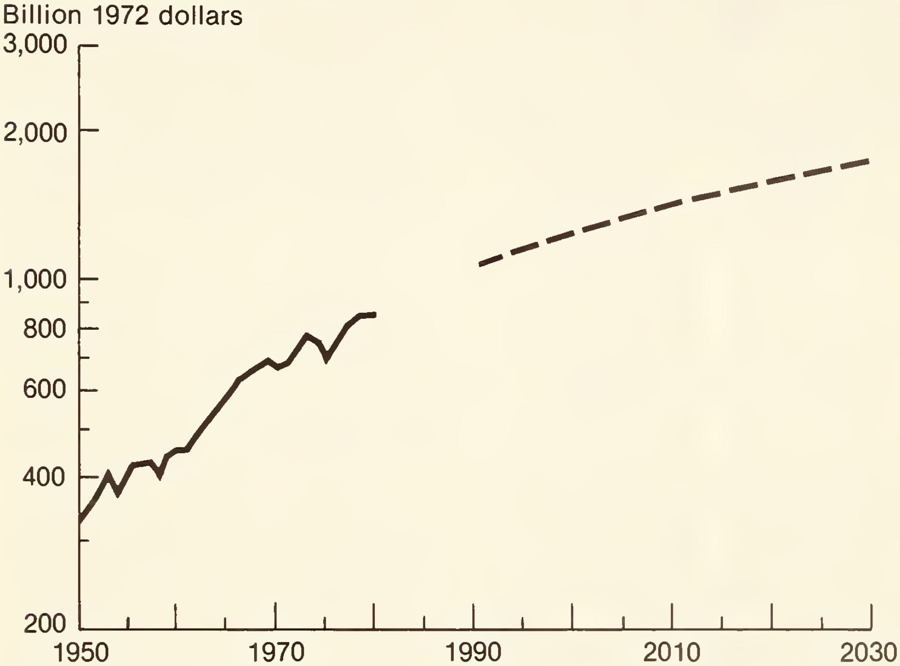
[33] U.S. Department of Commerce, Bureau of the Census. 1977 Census of Manufactures. Industry Series SIC 251. Preliminary Reports. MC77-I-25A-1(P) to MC 77-I-25A-7(P). 1979.

[34] Anonymous. Southern furniture market "satisfactory." Southern Lumberman. 238 (2955):12. June 1, 1979.

[35] Bonney, Joseph. Particleboard, MDF market analysis. Plywood and Panel 20(1):29–30. June 1979. McSwain, George A. Technical developments in the wood-based panel products industry. Committee on Wood-Based Panel Products. Food and Agriculture Organization of the United Nations. Fifth Session. Rome. November 9–11, 1977.

Figure 3.6

Value of Shipments of Manufactured Products, 1950–79, with Projections to 2030



dollar of shipments also reflects a general reduction in use of all raw materials per dollar of product value resulting from increases in the degree of processing of materials and rising relative costs of labor and capital per unit of production.[36]

Projected Demands for Timber Products in Manufacturing. Projections of timber products use per dollar of manufacturing shipments—shown in table 3.16 and Appendix 1, tables 1.11-1.14—have been based on (1) recent trends in materials use, (2) judgment as to the influence of technological, economic, and institutional factors in future decades, and (3) trends in relative prices of materials and production costs during the base period, as described earlier in this chapter. In general, these projections indicate a continuation of recent trends, including further declines in the use of lumber and plywood, increased use of particleboard, and little change for hardboard.

In spite of the projected decreases in use of lumber, veneer, and plywood, and the lack of significant change in hardboard use per dollar of shipments, total demands rise for all products because of the substantial increases projected in total value of shipments (table 3.16; Append. 1, tables 1.11-1.14). Projections of demand for lumber, for example, rise to 6.1 billion board feet (medium projection—base level price trends) by 2000, with further increases to 7.9 billion in 2030, some 84 percent above consumption in 1976. Demands for veneer and plywood are projected to grow about 55 percent (from 1.55 to 2.4 billion square feet, ⅜-inch basis) during the same period. Projected demands for hardboard rise about 2.4 times and increase about 2.8 times for particleboard, primarily due to growing use of medium density fiberboard.

Demand for Timber Products in Shipping

In 1976, some 6.9 billion board feet of lumber, 738 million square feet (⅜-inch basis) of veneer and plywood, and 66 million square feet (⅛-inch basis) of hardboard were used in shipping (table 3.17). These materials (about 16 percent of the lumber and 4 percent of the plywood consumed in 1976) were used for the manufacture of pallets, boxes, crates, hampers, baskets, and other wooden containers; and for dunnage, blocking, and bracing required for the transportation, handling, and storage of industrial, agricultural, and military products.

Lumber consumption in 1976 was a fifth higher than in 1970. Use of veneer and plywood and hardboard was also up by 25 percent and 14 percent respectively.

Demand for Timber Products in Pallets. The increases in lumber use in shipping since the early 1960's and in veneer and plywood consumption since 1970 have been entirely attributable to the steadily rising number of pallets produced. In 1960, some 62 million pallets were produced, consuming an estimated 1.6 billion board feet of lumber, 18 million square feet of plywood, and 2 million square feet of hardboard (table 3.18). By 1976, pallet production reached a record 196 million and consumed 4.8 billion board feet of lumber, 400 million square feet of plywood, and 39 million square feet of hardboard. Production in 1979 was reported to be 296 million units.[37]

The rapid increase in pallet production in the past 15 years has been in part due to the introduction of new methods of materials handling and to the construction of new facilities geared to pallet use. At the same time growth in industrial and agricultural production has increased demand in those areas where pallet systems were already established.

With respect to the future, a combination of rising labor, transportation, and storage costs is expected to bring increased pressures on all segments of industry and agriculture for improved materials handling systems. This, in turn, is likely to increase the demand for pallets and palletized systems.

Although traditional wooden pallets are by far the most common type

Pallet production has been rising rapidly, and now the pallet industry is the Nation's largest market for hardwood lumber.

[36] U.S. Department of Commerce, Bureau of the Census. *Op. cit.* 1979.

[37] Anonymous. Business briefs. Forest Prod. J. 30(7):11. 1980.

Table 3.16—*Timber products used in manufacturing in the United States, by product, specified years 1948–76, with projections of demand (base level price trends) to 2030*

Year	Lumber		Veneer and plywood (3/8-inch basis)		Hardboard (1/8-inch basis)		Particleboard[1] (3/4-inch basis)	
	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]
	Million board feet	*Board feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1948	3,924	0.0129	1,126	0.0037	(3)	.....	(3)	.....
1960	3,865	.0086	1,822	.0041	760	0.0017	106	0.0002
1965	4,609	.0078	1,562	.0027	1,135	.0019	476	.0008
1970	4,670	.0070	1,656	.0025	1,361	.0020	960	.0014
1976	4,300	.0057	1,550	.0020	1,380	.0018	1,510	.0020
				Low projections[4]				
1990	5,270	.0052	1,750	.0017	1,940	.0019	2,330	.0023
2000	5,640	.0050	1,870	.0016	2,180	.0019	2,670	.0024
2010	6,050	.0048	1,900	.0015	2,410	.0019	3,000	.0024
2020	6,160	.0046	1,970	.0015	2,540	.0019	3,210	.0024
2030	6,420	.0045	1,930	.0014	2,690	.0019	3,400	.0025
				Medium projections[4]				
1990	5,530	.0052	1,840	.0017	2,040	.0019	2,470	.0023
2000	6,130	.0050	2,040	.0016	2,390	.0019	2,930	.0024
2010	6,790	.0048	2,150	.0015	2,740	.0019	3,410	.0024
2020	7,220	.0046	2,330	.0015	3,020	.0019	3,800	.0024
2030	7,900	.0045	2,400	.0014	3,350	.0019	4,260	.0025
				High projections[4]				
1990	5,780	.0052	1,920	.0017	2,130	.0019	2,590	.0023
2000	6,610	.0050	2,200	.0016	2,560	.0019	3,170	.0024
2010	7,500	.0048	2,370	.0015	3,030	.0019	3,790	.0024
2020	8,210	.0046	2,660	.0015	3,440	.0019	4,350	.0024
2030	9,210	.0045	2,800	.0014	3,920	.0019	5,000	.0024

[1]Includes medium-density fiberboard.
[2]Use per dollar (1972 dollars) of shipments, 1948–76, computed by Forest Service (see table 3.15 for values of shipments).
[3]Not available.
[4]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Timber product use by manufacturing product group is shown in Appendix 1, tables 1.11, 1.12, 1.13, and 1.14. Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2, 1951; 1960—*Wood used in manufacturing industries, 1960.* Stat. Bull. 353, 1965; 1965—*Wood used in manufacturing industries, 1965.* Stat. Bull. 440, 1969. 1970 and 1976—Based on estimates of value of shipments (table 3.15) and trends in lumber use per dollar of shipments.

Projections: U.S. Department of Agriculture, Forest Service.

used, paper and plastic slip sheets have made some inroads into materials handling systems in the past few years.[38] Slip sheets offer the advantages of being relatively lower in cost, lighter in weight, and taking smaller amounts of space in storage and in use.[39] They are, however, often used in conjunction with traditional wooden pallets in so called "two-tier" systems, where pallets are used within a company's system but shipments out-of-plant are made on slip sheets. The net effect of this type of operation is an increase in the total demand for pallets.[40] In addition, slip sheets are not suitable for handling the wide range of industrial and agricultural products that can be transported with traditional pallet systems.

Since the mid-1950's, there has been a close relationship between pallet output and manufacturing shipments (fig. 3.7). Projections based on this relationship and assumed growth in manufacturing shipments show continuing large increases in demand for pallets (table 3.18). The medium projection, for example, rises threefold between 1976 and 2030. Rates of growth in projected pallet demand, however, drop rapidly from an average of 10.0 percent annually between 1970 and 1979 to 2.0 percent in the 1990's and 1.0 percent in the decade before 2030. The slowing growth early in the projection period is expected to come from increased competition from alternate systems. Later, growth in demand for pallets associated with use in new materials handling systems gradually ends, and projected increases in demand depend to a greater and greater degree on growth in industrial and agricultural production.

Lumber is the principal timber product used in pallets, averaging about 25 board feet per pallet in the last decade or so. However, plywood use has been growing and in 1976 averaged about 2 square feet (3/8-inch basis) per pallet. Relatively small amounts of hardboard are also consumed. In the future, plywood use per pallet is expected to rise slowly, while hardboard shows little change. Lumber use is projected to show a small decline due to the substitution of plywood and other materials, such as molded particleboard and medium density fiberboard.[41]

In response to the trends discussed above, lumber used for pallet production is projected to increase to 13.3

[38] Ebeling, Charles. Push-pulls global progress. Handling and Shipping Management 20(12):36–42. 1979.

[39] Anonymous. Pallets vs. slip sheets: the great controversy. Modern Materials Handling 34(6):66–71. 1979.

[40] McKeever, David B. and H. Edward Dickerhoof. United States consumption of wood-based panels for packaging and shipping—an outlook for the 1980's. Paper prepared for the United Nations Economic Commission for Europe, Symposium on Wood-Based Panels, Helsinki, May 12–16, 1980. 8 p. 1980.

[41] McKeever, David B. and H. Edward Dickerhoof. Lumber and panel products consumption for packaging and shipping in the United States—perspective for the 1980's. U.S. Dep. Agric., Forest Serv., Resource Bull. FPL-10. 6 p. Oct. 1980.

Table 3.17—*Timber products used in shipping in the United States, by product and end use, specified years 1948–76*

Year and end use	Lumber	Veneer and plywood (3/8-inch basis)	Hardboard (1/8-inch basis)
	Million board feet	*Million square feet*	*Million square feet*
1948			
Containers, wooden	3,997	1,672	(1)
Pallets	220	1	(1)
Dunnage, blocking, and bracing	740	(2)	(1)
Total	4,957	1,673	(1)
1960			
Containers, wooden	1,866	1,125	13
Pallets	1,550	18	2
Dunnage, blocking, and bracing	800	1	1
Total	4,216	1,144	16
1965			
Containers, wooden	1,829	596	20
Pallets	2,200	75	16
Dunnage, blocking, and bracing	856	12	3
Total	4,885	683	39
1970			
Containers, wooden	1,754	436	26
Pallets	3,150	140	28
Dunnage, blocking, and bracing	820	14	4
Total	5,724	590	58
1976			
Containers, wooden	1,140	318	22
Pallets	4,900	400	39
Dunnage, blocking, and bracing	860	20	5
Total	6,900	738	66

[1]Not available.
[2]Negligible.

Sources: Lumber for pallets: Estimates based on data published in: U.S. Department of Commerce, Business and Defense Administration. *Wooden pallets.* 1963; *Pallet industry growing by leaps and bounds.* Wood Construction and Building Materialist. 56(11):26–27; *The Appalachian pallet industry.* The Northern Logger and Timber Processor. 202(2):22–23, 60–61; *Pallets from low grade hardwoods.* Forest Products Journal 13(3):11–13; U.S. Department of Agriculture, Forest Service. *Wood used in manufacturing industries, 1960.* Stat. Bull. 353. 1965; 1976—Based on data supplied by the Wooden Pallet and Container Association. All other: U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2. 1951; 1960—*Wood used in manufacturing industries, 1960.* Stat. Bull. 353. 1965; 1965—*Wood used in manufacturing industries, 1965.* Stat. Bull. 440. 1969; 1970—Forest Service estimates based on pallet production, value of shipments of containers, and trends in timber products use in dunnage, blocking, and bracing; 1976—Veneer and plywood used for containers and pallets estimates from: *Long term plywood demand 1975–1985.* American Plywood Association. Other material use: U.S. Department of Agriculture, Forest Service.

billion board feet by 2030 (medium projection—base level price trends)—some 2.8 times consumption in 1976 (table 3.18). Plywood use is expected to rise 3.8 times to 1.5 billion square feet (3/8-inch basis) and hardboard about 3.1 times to 120 million square feet (1/8-inch basis) during the same period.

Demand for Timber Products in Wooden Containers. Between 1970 and 1976 the value of shipments (in 1972 dollars) of wooden containers, that is, nailed boxes and crates, wirebound boxes and crates, and veneer and plywood containers, dropped more than 27 percent, after moving slowly upward during the 1960's (table 3.19). This decline apparently reflected an acceleration of the displacement of wooden containers by fiber and plastic containers, metal and fiber barrels and pails, and multiwall bags that has been going on for the past 30 years.

Several factors contributed to these changes, including lower costs of substitute containers and their superior adaptability to automated packaging and shipping operations. In addition, lower shipping weights and associated lower freight costs have become increasingly important with the sharp increases in fuel prices since the early 1970's. In packaging some items, however, such as large bulky products, delicate instruments, glass, ceramics, and certain fruits and vegetables, these advantages continue to be outweighed by the need for special protection, and wooden containers are still used.

Although shipments of these latter items are expected to rise in future years, continued automation and efforts to lower shipping weights are expected to lead to further declines in wooden container demand, tempered to a large degree by continuing growth in manufacturing and agricultural shipments.

The use of lumber per dollar of shipments of wooden containers has shown a consistent downward trend in the past 25 years (table 3.19), reflecting increasing use of nonwood materials such as plastics and paperboard in conjunction with wood, changes in the types of containers produced,[42] and use of more efficient container manufacturing processes. These factors also affected the use of the other timber products in wooden containers; however, the net result was a slowing in the downward trend for veneer and plywood and a slow rise for hardboard. It seems likely that such trends will continue. Thus use of lumber and veneer and plywood per dollar has been projected to continue slowly down and hardboard to show some growth.

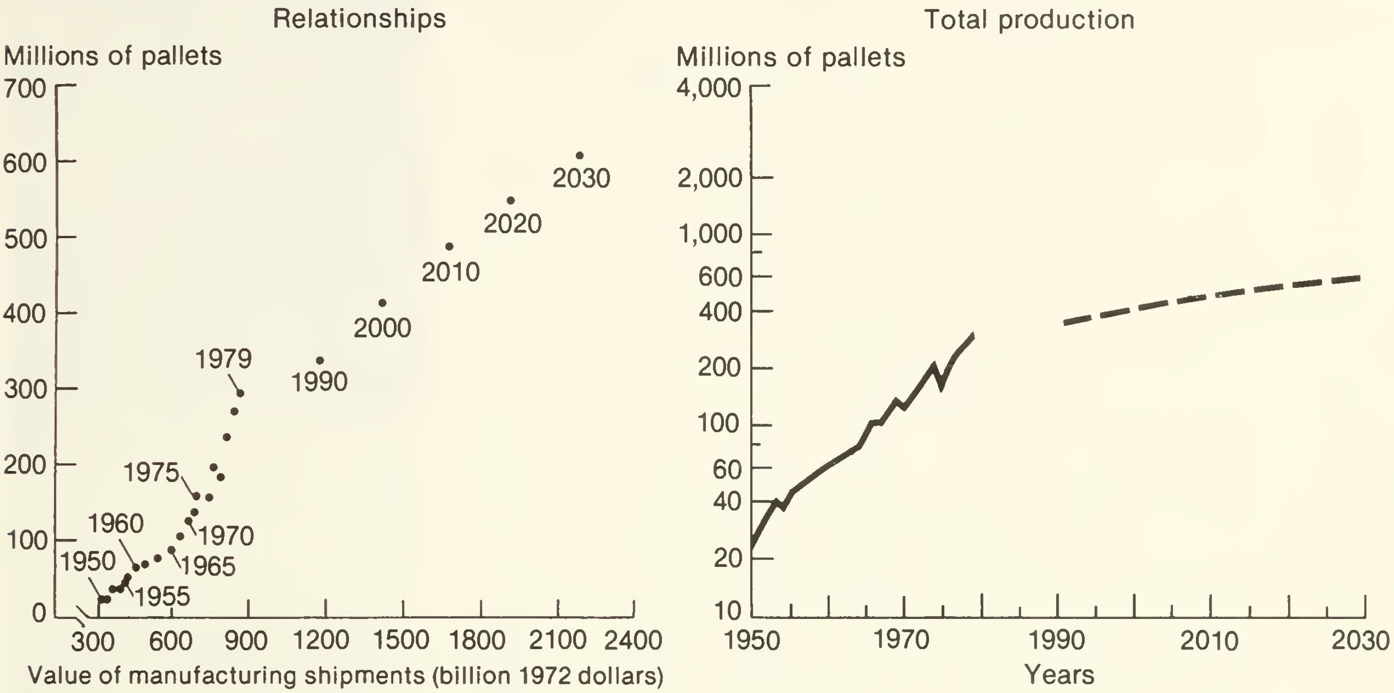
As a result of the declines projected for the value of shipments of wooden containers and use per dollar for both products, total lumber and veneer and plywood use continue to decline through the projection period. By 2030, projected lumber demand for wooden containers totals 870 million board feet (medium projection—base level price trends) about three-fourths consumption in 1976. Veneer and plywood demand drops by roughly a third to 200 million square feet (3/8-inch basis) and hardboard use about doubles.

Demand for Timber Products in Dunnage. In the past three decades, the volume of lumber used for dunnage, blocking, and bracing in railroad cars, trucks, and ships has fluctuated somewhat but increased about 0.5 percent per year to an estimated 860 million board feet (table 3.20). This relatively modest growth in a period of rapid increases in the shipment of goods of all kinds apparently reflects the effects of

[42] U.S. Department of Commerce, Bureau of the Census. 1977 Census of Manufactures. Industry Series. SIC 2441. MC77-I-24C-1(P), and SIC 2449. MC77-I-24C-3(P). Govt. Print. Off., Washington, D.C. 1979.

Figure 3.7

Pallet Production, 1950–79, with Projections to 2030



growth in containerized and bulk shipments as well as in palletized systems as discussed above. Growth in such shipments is expected to continue. The medium projection of demand for lumber for use in dunnage, blocking, and bracing has, therefore, been projected to increase to 980 million board feet by 2030 (medium projection—base level price trends), a growth rate of about 0.2 percent per year. Veneer and plywood use about triples and hardboard use doubles during the same period.

Projected Demand for Timber Products in Shipping. Projected demand for lumber in shipping, including pallets, containers, and dunnage, rises to 15.2 billion board feet by 2030 (medium projection—base level price trends), about 2.2 times consumption in 1976 (table 3.21). Veneer and plywood use is projected to increase about 2.4 times to 1.8 billion square feet (3/8-inch basis) and hardboard 2.7 times to 180 million square feet (1/8-inch basis) in the same time period. Nearly all of the increase for these products comes from the growth in pallet demand. By 2030, pallets account for 88 percent of the lumber, 85 percent of the veneer and plywood, and 67 percent of the hardboard used in shipping (medium projection).

Demand For Timber Products in Other Uses

In addition to the major end uses discussed above, an estimated 5.1 billion board feet of lumber, 4.8 billion square feet (3/8-inch basis) of plywood, and 3.3 billion square feet (3/8-inch basis) of other wood-based panel products were used in 1976 for other purposes (table 3.22). These included upkeep and improvement of nonresidential structures; roof supports and other construction in mines; made-at-home products such as furniture, boats, and picnic tables; and made-on-the-job products such as advertising and display structures.

There are no historical data on the consumption of timber products in these various uses. Accordingly, use for these purposes in 1962, 1970, and 1976 was estimated by subtracting volumes of timber products consumed in the specific end uses discussed above from the estimated total consumption of each product. These residuals probably include some lumber, plywood, and other panel products which properly belong in the construction, manufacturing, or shipping sectors. The "other uses" categories also include any statistical discrepancies associated with the estimates of production, imports, and exports used in estimating total consumption.

Lumber and other timber products are used for a wide variety of purposes such as stadium seats and made-on-the-job products like fences.

Table 3.18—*Timber products used in the manufacture of pallets in the United States, by product, 1960, 1965, 1970, and 1976, with projections of demand (base level price trends) to 2030*

Year	Pallet production	Lumber		Plywood (3/8-inch basis)		Hardboard (1/8-inch basis)	
		Use per pallet	Total	Use per pallet	Total	Use per pallet	Total
	Millions	*Board feet*	*Million board feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*
1960........	62	25	1,550	0.29	18	0.03	2
1965........	88	25	2,200	.85	75	.18	16
1970........	126	25	3,150	1.11	140	.22	28
1976........	196	25	4,800	2.04	400	.20	39
			Low projections[1]				
1990........	320	22	7,040	2.50	840	.20	65
2000........	380	22	8,380	2.50	950	.20	75
2010........	445	22	9,770	2.50	1,110	.20	90
2020........	495	22	10,850	2.50	1,230	.20	100
2030........	545	22	11,950	2.50	1,360	.20	110
			Medium projections[1]				
1990........	338	22	7,410	2.50	840	.20	65
2000........	410	22	9,040	2.50	1,030	.20	80
2010........	485	22	10,670	2.50	1,210	.20	95
2020........	545	22	11,970	2.50	1,360	.20	110
2030........	605	22	13,330	2.50	1,510	.20	120
			High projections[1]				
1990........	355	22	7,790	2.50	890	.20	70
2000........	440	22	9,640	2.50	1,100	.20	90
2010........	525	22	11,510	2.50	1,310	.20	105
2020........	595	22	13,020	2.50	1,480	.20	120
2030........	660	22	14,560	2.50	1,660	.20	130

[1]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Sources: Pallet production: 1960, 1965, 1970 and 1976—National Wooden Pallet and Container Association. Wood use: See source note, table 3.17.

Projections: U.S. Department of Agriculture, Forest Service.

Because of the lack of a statistical base for projecting these residuals, it was assumed that use for these purposes would rise in line with projected demands in the other markets, except new housing. New housing was excluded, because its demand is so strongly influenced by the age distribution of the population.

Under this assumption, the medium level (with base level price trends) of demand for lumber in "other uses" rises to about 9.4 billion board feet in 2030, some 83 percent above 1976. Projected demands for plywood double to 9.9 billion square feet, and the combined total for hardboard, insulating board, and particleboard rises to 10.0 billion square feet, more than triple 1976 consumption.

Summary of Demand Projections for Lumber, Plywood, and Other Board Products

Lumber Consumption and Demand. Lumber consumption in all uses in 1976 was 42.7 billion board feet (table 3.23, fig. 3.8; Append. 1, table 1.15). This was about 10 percent above average annual consumption in the 1950's and 1960's, but below use in most years since 1970. In 1978, lumber consumption rose to a record 48.7 billion board feet—about 14 percent more than in 1976 and above the levels attained in the early 1900's, when lumber was the most important raw material used in the United States for construction, manufactured products, and shipping (table 3.24). Consumption in 1979 totaled 47.1 billion board feet.

The projected demand for lumber shows a sharp rise in the 1980's, then a slower increase through the rest of the projection period.

Per capita consumption in 1976 was 198 board feet, about the same as in the 1960's (Append. 1, table 1.15). However, this was far below the early 1900's, when per capita use reached a high of over 500 board feet, and substantially under the average for most years prior to 1960.

More than half of the lumber consumed in 1976 was used for housing—38 percent of the total for construction of new units and 13 percent for the maintenance and repair of existing units. Shipping accounted for another 16 percent, new nonresidential construction and manufacturing about 10 percent each, and the remaining 12 percent was consumed in all other uses.

Projected demand for lumber.—Projected demand for lumber with base level price trends [43] shows a rather sharp rise to a 1990 level of 58.0 billion board feet (medium projection), or 238 board feet per capita. This growth is attributable largely to the projected rise in demands for new housing and for pallets.

After 1990, primarily because of the leveling off and subsequent decline in housing, projected demand increases more slowly to 67.3 billion board feet in 2030—about 1.6 times consumption in 1976.

[43] As discussed earlier in this chapter, projections with base level price trends assume a continuation of relative price relationships for timber products that existed in 1950's, 1960's and early 1970's—the period during which the basic data on unit use were collected. (See Chapter 8 for a discussion of the effects of prospective price increases on timber products demand.)

In 1976, softwood species composed about 85 percent of total lumber consumption, somewhat above the 81 percent in 1970 and the 83 percent in 1962 (table 3.23). Such fluctuations are largely due to differential strength of the various markets, and the wide variation in species consumption between them. As shown in the tabulation at right, well over 90 percent of the lumber used in new housing in the 1960's is estimated to have been softwood species. In contrast, only about 50 percent of the lumber used in shipping was softwood. The increase in percentage of softwood usage in housing between 1962 and 1970 was largely due to the decline in hardwood flooring use, whereas the drop in shipping was the result of the rapid growth of pallets which are mostly manufactured from hardwoods.

Based on these trends and the estimates of total lumber use in the various markets discussed earlier, softwood lumber demand is projected to increase to 52.4 billion board feet in 2010 and then slowly decline to 51.3 billion board feet in 2030, largely a reflection of new housing construction. Hardwood consumption, on the other hand, rises throughout the projection period to 16.0 billion board feet, as manufacturing and shipping markets continue up. As a result of these trends, about 76 percent of projected lumber consumption in 2030 is softwood species.

The alternative assumptions about population and economic growth discussed in Chapter 2 have substantial impacts on the demand for lumber in all end uses (table 3.23). As a result, by 2030 total demand with base level price trends ranges from 59.8 billion board feet to 77.8 billion board feet.

Lumber exports and imports.—In addition to domestic demand, there has been a relatively modest but slowly growing demand for U.S. lumber in foreign markets in recent years (table 3.24, Append. 1, table 1.15). Since the end of World War II, U.S. exports of lumber have increased more than five times to 2.1 billion board feet in 1979—a volume equal to almost 6 percent of United States production. The bulk of the increased exports in recent years has been composed of softwood shipments to Japan, Canada, and Europe, with smaller volumes to Central and South America.[44] About two-thirds of the hardwood lumber exported goes to Canada and most of the remainder to Europe.

[44] For a more detailed discussion of current and prospective U.S. trade in timber products, see Chapter 4.

Table 3.19—*Value of shipments and timber products used in the manufacture of wooden containers in the United States, by product, 1960, 1965, 1970, and 1976, with projections of demand (base level price trends) to 2030*

Year	Value of wooden container shipments	Lumber: Use per dollar of shipments[1]	Lumber: Total	Veneer and plywood (3/8-inch basis): Use per dollar of shipments[1]	Veneer and plywood: Total	Hardboard (1/8-inch basis): Use per dollar of shipments[1]	Hardboard: Total
	Million 1972 dollars	*Board feet*	*Million board feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*
1960	426	4.38	1,866	2.64	1,125	0.031	13
1965	455	4.02	1,829	1.31	596	.044	20
1970	464	3.77	1,750	.94	436	.056	26
1976	337	3.39	1,140	.94	318	.066	22
Low projections[2]							
1990	372	2.94	1,090	.73	270	.096	40
2000	364	2.79	1,010	.67	240	.108	40
2010	350	2.68	940	.63	220	.120	40
2020	349	2.60	910	.60	210	.129	50
2030	343	2.54	870	.57	200	.138	50
Medium projections[2]							
1990	375	2.94	1,100	.73	270	.096	40
2000	364	2.79	1,010	.67	240	.108	40
2010	355	2.68	950	.63	220	.120	40
2020	349	2.60	910	.60	210	.129	50
2030	343	2.54	870	.57	200	.138	50
High projections[2]							
1990	377	2.94	1,110	.73	280	.096	40
2000	368	2.79	1,030	.67	250	.108	40
2010	361	2.68	970	.63	250	.108	40
2020	355	2.60	930	.60	210	.129	50
2030	350	2.54	890	.57	200	.138	50

[1] 1972 dollars.
[2] Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Sources: Value of shipments: U.S. Department of Commerce, Bureau of the Census. 1948—*Value of shipments of selected classes of products.* Ser. MAS-53(final). 1955; 1960 and 1965—*Growth in shipments by classes of manufactured products.* 1971; 1970—Forest Service estimate based on data published in *Annual survey of manufactures,* 1970 M-70(AS)-1. 1972. 1976—Forest Service estimate based on data published in *Annual survey of manufactures, 1976. Value of product shipments.* M-76(AS)-2. Timber products use: U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2. 1951; 1960—*Wood used in manufacturing industries, 1960.* Stat. Bull. 353. 1965; 1965—*Wood used in manufacturing industries, 1965.* Stat. Bull. 440. 1969; 1970 and 1976—Forest Service estimates.

Projections: U.S. Department of Agriculture, Forest Service.

Estimates of softwood species as a percent of total lumber consumption

Year	*All end uses*	*New housing*	*Residential upkeep and improvements*	*New nonresidential construction*	*Manufacturing*	*Shipping*	*Other*
1962	83	92	94	84	60	52	91
1970	81	96	97	78	52	49	92
Medium projections—base level price trends							
1990	83	97	98	78	50	49	93
2000	81	97	98	79	49	48	94
2010	80	97	98	80	44	48	95
2020	78	97	98	81	43	43	95
2030	76	97	98	81	41	43	95

Table 3.20—*Timber products used in dunnage, blocking, and bracing in the United States, by product, specified years 1948–76, with projections of demand (base level price trends) to 2030*

Year	Lumber	Veneer and plywood (3/8-inch basis)	Hardboard (1/8-inch basis)
	Million board feet	*Million square feet*	*Million square feet*
1948	740	(1)	(2)
1960	800	1	1
1965	856	12	3
1970	820	14	4
1976	860	20	5
Low projections[3]			
1990	900	30	10
2000	920	40	10
2010	940	40	10
2020	950	50	10
2030	960	50	10
Medium projections[3]			
1990	910	30	10
2000	930	40	10
2010	950	50	10
2020	970	50	10
2030	980	60	10
High projections[3]			
1990	910	40	10
2000	940	40	10
2010	960	50	10
2020	980	60	10
2030	1,000	60	10

[1]Negligible.
[2]Not available.
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Sources: 1948, 1960, 1965, 1970—See table 3.17. 1976—Forest Service estimates.

Projections: U.S. Department of Agriculture, Forest Service.

As discussed in Chapter 4, projected softwood lumber exports with base-level price trends rise to about 1.9 billion board feet in 1990, but subsequently slowly decline in response to decreased availability of the high-quality lumber produced from the old-growth timber in the Pacific Northwest. Hardwood lumber exports show a slow rise through the projection period, largely a reflection of the improved U.S. hardwood timber supply situation.

Accordingly, total lumber exports are projected to rise to 2.1 billion board feet in 1990, primarily due to increases in softwood exports. In subsequent decades, the declines in softwood exports are balanced by increases for hardwoods and there is no change in total exports.

Between the late 1940's and 1978, lumber imports grew from less than a billion board feet to more than 12.2 billion—an increase that accounted for more than half of the total expansion in timber products imports during this period. Nearly all of the increase was composed of softwoods from Canada, chiefly from British Columbia. By the mid-1970's, imports amounted to more than a fifth of U.S. softwood lumber consumption. Hardwood lumber imports, mostly from the tropical regions of the world and from Canada, fluctuated between 0.1 and 0.4 billion board feet.

Findings of recent Canadian studies, summarized in Chapter 4, show that Canada has the resources to support some additional expansion of lumber production and shipments to the United States particularly from interior British Columbia. However, the harvest of timber suitable for the economic manufacture of lumber may be approaching a limit by 2000. As a result of this, growing Canadian domestic demand, and increasing competition from other importing countries, it has been estimated that with base level price trends, softwood lumber imports would peak at 13.5 billion board feet in 1990 and then slowly decline to 12.0 billion in 2030. Hardwood lumber imports are projected to slowly increase to about 1.0 billion board feet over the projection period.

Demand on U.S. mills for lumber.—Domestic lumber production was 38.3 billion board feet in 1978—somewhat above the 36.3 billion board feet produced in 1976 and the average of 36 billion board feet in the 1950's, 1960's, and early 1970's (table 3.24; Append. 1, table 1.15).

Given the medium projections of U.S. demand, imports, and exports discussed above, projected demand for lumber from U.S. mills with base level price trends rises to 53.6 billion board feet in 2010 and subsequently slowly increases to 56.4 billion in 2030.

Since the early 1900's softwoods have accounted for about 80 percent of domestic lumber production. In response to differences in the projected rates of growth in demands in the major end uses and net imports discussed above, the proportion of domestic production composed of softwoods is projected to decline over the projection period. Demand on U.S. mills for softwood lumber stabilizes at about 41 billion board feet in 2010 and subsequent decades and by 2030 composes about 73 percent of total output. Hardwoods continue up throughout the projection period, rising to 15.5 billion board feet in 2030.

Table 3.21—*Timber products used in shipping in the United States, by product, specified years 1948–76, with projections of demand (base level price trends) to 2030*

Year	Lumber	Veneer and plywood (3/8-inch basis)	Hardboard (1/8-inch basis)
	Million board feet	*Million square feet*	*Million square feet*
1948	4,957	1,673	(1)
1960	4,216	1,144	16
1965	4,885	683	39
1970	5,720	591	58
1976	6,900	738	66
Low projections[2]			
1990	9,030	1,100	110
2000	10,300	1,230	130
2010	11,650	1,370	140
2020	12,690	1,480	150
2030	13,760	1,610	170
Medium projections[2]			
1990	9,420	1,140	120
2000	10,980	1,310	130
2010	12,570	1,480	150
2020	13,850	1,620	170
2030	15,180	1,770	180
High projections[2]			
1990	9,810	1,210	120
2000	11,610	1,390	140
2010	13,440	1,590	160
2020	14,930	1,750	180
2030	16,450	1,920	190

[1]Not available.
[2]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Sources: U.S. Department of Agriculture, Forest Service. 1948—*Wood used in manufacture, 1948.* Forest Resource Rep. 2, 1951; 1960—*Wood used in manufacturing industries, 1960.* Stat. Bull. 353, 1965; 1965—*Wood used in manufacturing industries, 1965.* Stat. Bull. 440, 1969; 1970—Estimates based on pallet production, value of shipments of containers, and trends in timber products use in dunnage, blocking, and bracing. 1976—See table 3.17.

Projections: U.S. Department of Agriculture, Forest Service.

Plywood Consumption and Demand. Plywood consumption totaled 20.6 bil-

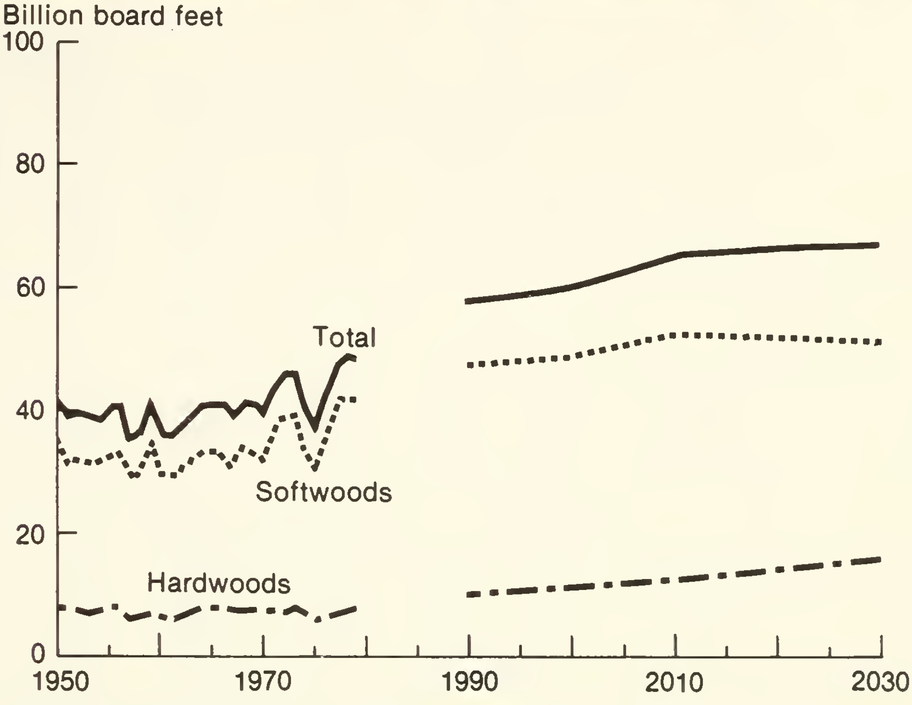
Table 3.22—*Timber products used for other purposes*[1] *in the United States, by product, 1962, 1970, and 1976, with projections (base level price trends) to 2030*

Year	Lumber	Plywood (3/8-inch basis)	Board (3/8-inch basis)[2]
	Million board feet	*Million square feet*	*Million square feet*
1962	6,180	2,946	[3]
1970	7,450	4,796	2,400
1976	5,100	4,763	3,278
Low projections[4]			
1990	6,365	6,600	5,305
2000	6,855	7,275	6,175
2010	7,560	7,955	7,220
2020	7,950	8,535	7,930
2030	8,325	8,935	8,640
Medium projections[4]			
1990	6,625	6,775	5,505
2000	7,340	7,645	6,595
2010	8,210	8,535	7,900
2020	8,710	9,285	8,880
2030	9,350	9,930	10,025
High projections[4]			
1990	6,875	6,970	5,695
2000	7,820	8,020	6,975
2010	8,920	9,160	8,595
2020	9,530	10,115	9,875
2030	10,505	11,075	11,390

[1]Includes upkeep and improvement of nonresidential buildings and structures; made-on-the-job items, such as advertising and display structures; and a wide variety of miscellaneous products and uses.
[2]Hardboard, insulating board, and particleboard (including waferboard, flakeboard, composite board, and medium-density fiberboard).
[3]Not available.
[4]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Figure 3.8

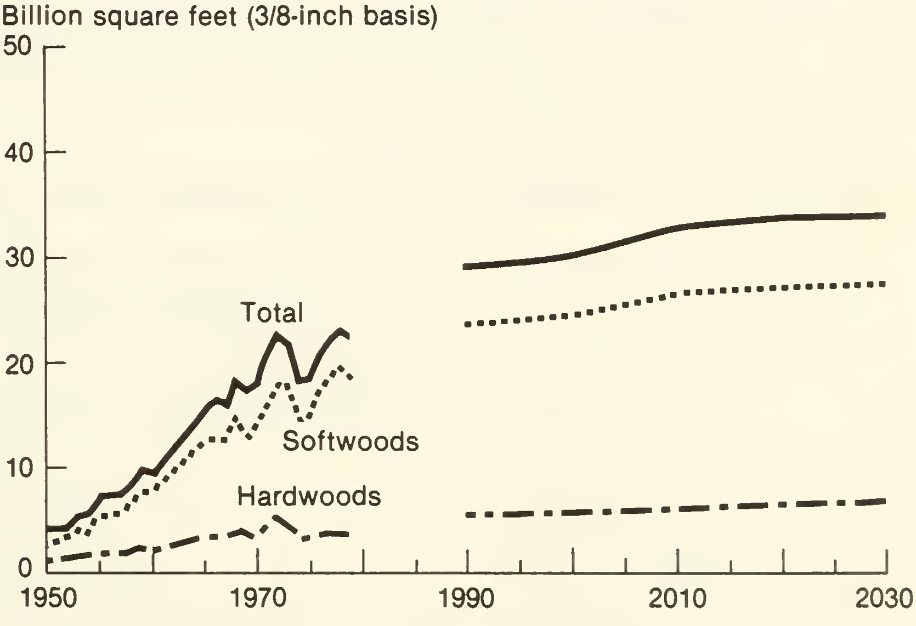
Lumber Consumption, 1950-79, with Projections* to 2030



*Base level price trends

Figure 3.9

Plywood Consumption, 1950-79, with Projections* to 2030



*Base level price trends

lion square feet (3/8-inch basis) in 1976 and 22.9 billion square feet in 1978 (tables 3.25, and 3.26; fig. 3.9; Append. 1, table 1.16). At this latter level, consumption was about five times the volume used in 1950 and slightly above the previous record set in 1972. Per capita consumption has also shown a sharp upward trend during this period, rising from around 25 square feet in 1950 to more than 100 square feet in the 1970's.

About 40 percent of the plywood consumed in 1976 went into the production of new housing, and 25 percent into other kinds of construction including residential upkeep and improvements. Manufacturing accounted for about 7 percent, shipping 4 percent, and the remainder was used in the wide variety of end uses listed in the footnote to table 3.25.

Projected demand for plywood.—As noted earlier in this chapter, much of the rapid rise in plywood consumption in the 1950's and 1960's was due to its widespread substitution for lum-

Table 3.23—*Lumber consumption in the United States, by per capita use, softwoods and hardwoods, and end use, 1962, 1970, and 1976, with projections (base level price trends) to 2030*

Year	Total	Per capita	Species group		End use					
			Softwoods	Hardwoods	New housing	Residential upkeep and improvements	New nonresidential construction[1]	Manufacturing	Shipping	All other[2]
	Million board feet	*Board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*	*Million board feet*
1962	37,300	200	30,800	6,500	13,940	4,400	4,200	4,240	4,340	6,180
1970	39,500	193	32,200	7,300	12,270	4,690	4,700	4,670	5,720	7,450
1976	42,700	198	36,200	6,500	16,240	5,690	4,470	4,300	6,900	5,100
					Low projections[3]					
1990	55,210	234	45,540	9,670	21,845	7,110	5,590	5,270	9,030	6,365
2000	55,110	224	44,610	10,500	18,725	7,680	5,910	5,640	10,300	6,855
2010	59,440	237	47,680	11,760	19,800	8,140	6,240	6,050	11,650	7,560
2020	61,490	243	48,360	13,130	19,580	8,570	6,540	6,160	12,690	7,950
2030	59,780	240	45,790	13,990	15,645	8,730	6,900	6,420	13,760	8,325
					Medium projections[3]					
1990	57,950	238	47,830	10,120	23,345	7,160	5,870	5,530	9,420	6,625
2000	59,880	230	48,590	11,290	21,320	7,790	6,320	6,130	10,980	7,340
2010	65,310	237	52,430	12,880	22,540	8,390	6,810	6,790	12,570	8,210
2020	66,590	230	51,970	14,620	20,670	8,850	7,290	7,220	13,850	8,710
2030	67,270	224	51,290	15,980	17,910	9,080	7,850	7,900	15,180	9,350
					High projections[3]					
1990	60,550	238	49,990	10,560	24,715	7,210	6,160	5,780	9,810	6,875
2000	64,370	228	52,320	12,050	23,670	7,900	6,760	6,610	11,610	7,820
2010	72,600	230	58,600	14,000	26,580	8,730	7,430	7,500	13,440	8,920
2020	72,660	205	56,600	16,060	22,610	9,260	8,120	8,210	14,930	9,530
2030	77,830	198	59,940	17,890	23,065	9,680	8,920	9,210	16,450	10,505

[1]In addition to new construction, includes railroad ties laid as replacements in existing track and lumber used by railroads for railcar repair.
[2]Includes upkeep and improvement of nonresidential buildings and structures; made-at-home projects, such as furniture, boats, and picnic tables; made-on-the-job items, such as advertising and display structures; and a wide variety of miscellaneous products and uses.
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: See tables 3.8, 3.10, 3.12, 3.13, 3.16, 3.21, 3.22, and 3.24.

Projections: U.S. Department of Agriculture, Forest Service.

ber in sheathing and subflooring in residential construction, in concrete formwork in nonresidential construction, and to the growing use of hardwood plywood for paneling in residential construction and in manufacture. Trends in use in the late 1960's and 1970's and data obtained from studies of wood use in construction suggest that most of the potential substitution of softwood plywood for lumber in construction has taken place. Moreover, as discussed earlier, considerable evidence exists to suggest probable future losses in construction markets to other recently developed panel products. Nonetheless, projected growth in construction, manufacturing, and shipping is large enough to result in substantial increases in projected demands for plywood. With a continuation of base level price trends, the medium projection increases throughout the projection period reaching 34.1 billion square feet in 2030, about two-thirds larger than in 1976. Per capita demand rises to 119 square feet in 1990 and again in 2010 before dropping to 114 in 2030.

In 1976, softwood species, chiefly Douglas-fir and southern pine, composed 84 percent of total plywood consumption. Like lumber, this was somewhat larger than the percentage in 1970 and 1962 (table 3.25). As shown in the tabulation below, the plywood used in the various types of construction is

Estimates of softwood species as a percent of total plywood consumption

Year	*All end uses*	*New housing*	*Residential upkeep and improvements*	*New nonresidential construction*	*Manufacturing*	*Other**
1962	79	95	95	95	38	72
1970	79	90	94	95	44	63
		Medium projections—base level price trends				
1990	82	90	94	95	62	61
2000	81	90	94	95	63	61
2010	81	90	94	95	64	61
2020	80	90	94	95	67	61
2030	80	90	94	95	68	61

*Includes shipping.

Table 3.24—*Lumber consumption, exports, imports, and production in the United States, specified years 1920–79, with projections (medium growth in population and economic activity—base level price trends) to 2030*

Year	Consumption				Exports			Imports			Production[1]		
	Total	Per capita	Softwoods	Hardwoods	Total	Softwoods[1]	Hardwoods	Total	Softwoods[1]	Hardwoods	Total	Softwoods	Hardwoods
	Billion board feet	*Board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*
1920	34.6	325	27.4	7.2	1.7	1.5	0.2	1.4	1.3	([2])	35.0	27.6	7.4
1925	40.2	347	32.8	7.5	2.6	2.2	.4	1.8	1.7	0.1	41.0	33.3	7.7
1930	28.2	229	22.5	5.8	2.4	1.9	.4	1.2	1.2	([2])	29.4	23.2	6.1
1935	22.1	173	17.6	4.5	1.3	1.0	.3	.4	.4	.1	22.9	18.2	4.7
1940	31.0	234	25.4	5.5	1.0	.8	.2	.7	.6	.1	31.2	25.6	5.5
1945	28.8	205	21.7	7.0	.4	.3	.1	1.1	.9	.2	28.1	21.1	7.0
1950	40.9	269	33.4	7.5	.5	.4	.1	3.4	3.1	.3	38.0	30.6	7.4
1955	40.1	242	32.5	7.6	.8	.7	.2	3.6	3.3	.3	37.4	29.8	7.6
1960	36.0	199	29.6	6.4	.9	.7	.2	3.9	3.6	.3	32.9	26.7	6.3
1965	41.1	212	33.4	7.7	.9	.8	.1	5.2	4.9	.3	36.8	29.3	7.5
1970	39.5	193	32.2	7.3	1.2	1.1	.1	6.1	5.8	.3	34.7	27.5	7.1
1971	43.5	210	36.3	7.1	1.1	.9	.2	7.6	7.2	.4	37.0	30.0	6.9
1972	45.8	219	38.8	7.0	1.4	1.2	.2	9.4	9.0	.4	37.7	31.0	6.8
1973	46.2	220	38.9	7.3	2.0	1.8	.2	9.6	9.0	.5	38.6	31.6	7.0
1974	40.1	189	33.0	7.2	1.8	1.6	.2	7.3	6.8	.4	34.6	27.7	6.9
1975	37.0	173	31.1	5.9	1.6	1.4	.2	6.0	5.7	.3	32.6	26.7	5.9
1976	42.7	198	36.2	6.5	1.8	1.6	.2	8.2	8.0	.3	36.3	29.9	6.4
1977	46.9	216	40.1	6.8	1.7	1.4	.2	10.7	10.4	.3	37.9	31.2	6.7
1978	48.7	223	41.8	7.0	1.7	1.4	.4	12.2	11.9	.4	38.3	31.3	7.0
1979[3]	47.1	213	39.8	7.3	2.1	1.8	.4	11.5	11.2	.4	37.7	30.4	7.3

Projections

Year	Total demand				Exports			Imports			Demand on U.S. mills		
1990	57.9	238	47.8	10.1	2.1	1.9	.2	13.9	13.5	.4	46.2	36.2	9.9
2000	59.9	230	48.6	11.3	2.1	1.8	.3	13.6	13.0	.6	48.4	37.4	11.0
2010	65.3	237	52.4	12.9	2.1	1.7	.4	13.8	13.0	.8	53.6	41.1	12.5
2020	66.6	230	52.0	14.6	2.1	1.6	.5	13.4	12.5	.9	55.3	41.1	14.2
2030	67.3	224	51.3	16.0	2.1	1.6	.5	13.0	12 0	1.0	56.4	40.9	15.5

[1]Includes small volumes of mixed species (not classified as softwoods or hardwoods).
[2]Less than 50 million board feet.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Lumber production and mill stocks.* Curr. Ind. Reps. Ser. MA-24T. Annual, *U.S. exports: schedule B commodity by country.* FT 410. Monthly, *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.

Projections: U.S. Department of Agriculture, Forest Service.

Table 3.25—*Plywood consumption in the United States, by per capita use, softwoods and hardwoods, and end use, 1962, 1970, and 1976, with projections (base level price trends) to 2030*

(3/8-inch basis)

Year	Total	Per capita	Species group		End use					
			Softwoods	Hardwoods	New housing	Residential upkeep and improvements	New nonresidential construction	Manufacturing	Shipping	All other[1]
	Million square feet	*Square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*
1962	11,716	63	9,311	2,404	4,180	1,030	1,690	1,870	(2)	2,946
1970	17,822	87	14,038	3,784	6,330	2,510	1,939	1,656	591	4,796
1976	20,561	96	17,202	3,360	8,285	3,350	1,875	1,550	738	4,763
Low projections[3]										
1990	27,800	118	22,670	5,130	11,060	4,160	3,130	1,750	1,100	6,600
2000	27,850	113	22,450	5,400	9,325	4,490	3,660	1,870	1,230	7,275
2010	30,050	120	24,260	5,790	9,855	4,760	4,210	1,900	1,370	7,955
2020	31,390	124	25,330	6,060	9,705	5,080	4,620	1,970	1,480	8,535
2030	30,490	122	24,410	6,080	7,755	5,240	5,020	1,930	1,610	8,935
Medium projections[3]										
1990	29,000	119	23,670	5,330	11,825	4,190	3,230	1,840	1,140	6,775
2000	30,050	115	24,280	5,770	10,645	4,550	3,860	2,040	1,310	7,645
2010	32,840	119	26,590	6,250	11,235	4,900	4,540	2,150	1,480	8,535
2020	33,830	117	27,220	6,610	10,255	5,240	5,100	2,330	1,620	9,285
2030	34,130	114	27,290	6,840	8,900	5,450	5,680	2,400	1,770	9,930
High projections[3]										
1990	30,170	118	24,640	5,530	12,520	4,220	3,330	1,920	1,210	6,970
2000	32,140	114	26,010	6,130	11,840	4,620	4,070	2,200	1,390	8,020
2010	36,390	115	29,510	6,880	13,270	5,100	4,900	2,370	1,590	9,160
2020	36,890	104	29,670	7,220	11,225	5,480	5,660	2,660	1,750	10,115
2030	39,540	101	31,770	7,770	11,495	5,810	6,440	2,800	1,920	11,075

[1]Includes upkeep and improvement of nonresidential buildings and structures; mining; made-at-home projects, such as furniture and boats; made-on-the-job items, such as advertising and display structures; and a wide variety of other miscellaneous products and uses. Also includes shipping in 1962.
[2]Included in all other uses.
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Estimates for manufacturing and shipping contain veneer consumed in other than plywood production. Data may not add to totals because of rounding.

Sources: See tables 3.8, 3.10, 3.12, 3.13, 3.16, 3.21, 3.22, and 3.26.

Projections: U.S. Department of Agriculture, Forest Service.

largely from softwood species, while softwoods compose a somewhat smaller percentage of total plywood use in the other major markets.

Based on the trends shown in the tabulation and the estimates of total plywood use in the various markets discussed earlier, softwood plywood demand (medium level—base level price trends) is projected to rise to 26.6 billion square feet in 2010 and remain at roughly that level through 2030, as declines in new housing use are offset by continued increases in the other markets (table 3.26). Hardwood plywood consumption increases about 47 percent by 1990 and slowly continues up throughout the projection period.

As in the case of lumber, the alternative assumptions on growth in population and economic activity have substantial impacts on projected demand (table 3.25, fig. 3.12). For example, the high projection with base level price trends reaches 39.5 billion square feet in 2030, nearly 92 percent above consumption in 1976, while the low projection increases about 48 percent to 30.5 billion square feet.

Plywood exports and imports.—Plywood exports, consisting largely of softwoods, have fluctuated but have shown some small growth in the 1970's. Total shipments reached 0.9 billion square feet (3/8-inch basis) in 1975 before dropping to 0.3 billion in 1978 (table 3.26). A return to somewhat higher levels is likely, and total exports are projected to range between 0.6 and 0.9 billion square feet through 2030. Nearly all are expected to be softwood species.

Veneer exports (not included in table 3.26) totaled 768 million square feet (surface measure) in 1976, roughly five times the volume in the mid-1960's. Despite this, increased veneer exports are not expected to become a significant source of demand for domestically produced veneer logs.

In contrast to exports, hardwood plywood imports have increased rapidly in the past 2½ decades. Annual imports for the 1970–78 period averaged about 2.3 billion square feet (3/8-inch), although yearly figures ranged from 1.6 to 3.2 billion in response to changes in the strength of the major domestic markets (table 3.26). About 84 percent of

Table 3.26—*Plywood consumption, exports, imports, and production in the United States, specified years 1950–79, with projections (medium growth in population and economic activity—base level price trends) to 2030*

(3/8-inch basis)

Year	Consumption				Exports			Imports			Production[1]		
	Total	Per capita	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods[2]	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods
	Billion square feet	*Square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*
1950	....	...	2.7	...	([3])	([3])	([3])	([3])	([3])	([3])	....	2.7	...
1955	7.1	43	5.3	1.8	([3])	([3])	([3])	0.4	([3])	0.4	6.6	5.3	1.4
1960	9.6	53	7.8	1.8	([3])	([3])	([3])	.7	([3])	.7	8.9	7.8	1.1
1965	15.5	80	12.4	3.1	([3])	([3])	([3])	1.1	([3])	1.0	14.5	12.4	2.0
1970	17.8	87	14.0	3.8	0.2	0.1	0.1	2.0	([3])	2.0	15.9	14.1	1.8
1971	20.7	100	16.3	4.5	.1	.1	([3])	2.5	([3])	2.5	18.3	16.4	1.9
1972	22.8	109	17.6	5.2	.2	.2	([3])	3.2	([3])	3.2	19.9	17.8	2.0
1973	21.8	104	17.5	4.3	.5	.4	([3])	2.5	([3])	2.5	19.7	17.9	1.8
1974	17.7	84	14.8	3.0	.6	.5	.1	1.6	([3])	1.6	16.7	15.3	1.4
1975	17.8	83	14.9	2.9	.9	.8	.1	1.9	([3])	1.9	16.8	15.7	1.1
1976	20.6	96	17.2	3.4	.8	.7	.1	2.4	([3])	2.4	19.0	17.9	1.1
1977	22.0	101	18.6	3.4	.4	.3	.1	2.3	([3])	2.3	20.1	18.9	1.2
1978	22.9	105	19.3	3.6	.3	.3	([3])	2.6	0.1	2.5	20.7	19.5	1.2
1979[4]	21.4	97	18.2	3.2	.4	.4	([3])	2.1	([3])	2.1	19.7	18.6	1.1
						Projections							
Year	Total demand				Exports			Imports			Demand on U.S. mills		
1990	29.0	119	23.7	5.3	.9	.9	([3])	3.5	([3])	3.5	26.4	24.6	1.8
2000	30.0	115	24.3	5.8	.8	.8	([3])	3.7	([3])	3.7	27.2	25.1	2.1
2010	32.8	119	26.6	6.2	.7	.7	([3])	4.0	([3])	4.0	29.5	27.3	2.2
2020	33.8	117	27.2	6.6	.6	.6	([3])	4.0	([3])	4.0	30.4	27.8	2.6
2030	34.1	114	27.3	6.8	.6	.6	([3])	3.8	([3])	3.8	30.9	27.9	3.0

[1]Includes production from both domestic and imported species.
[2]Includes mixed species (not classified as softwoods or hardwoods).
[3]Less than 50 million square feet.
[4]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Softwood plywood.* Curr. Ind. Reps. Ser. MA-24H. Annual., *Hardwood plywood.* Curr. Ind. Reps. Ser. MA-24F. Annual., *U.S. exports: schedule B commodity by country.* FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.

Projections: U.S. Department of Agriculture, Forest Service.

Plywood consumption has been rising rapidly and substantial further growth is expected. Future increases in demand, however, are expected to be constrained by the substitution of particleboard in construction and manufacturing uses.

total hardwood plywood imports in 1978 came from Korea and Taiwan and consisted chiefly of lauan from the forests of insular Southeast Asia. Assuming a continuation of base level price trends, hardwood plywood imports have been projected to rise to 4.0 billion square feet by 2010. After that, the increasing competition for the available supplies of tropical hardwood timber and the improving situation in the United States are expected to cause imports of hardwood plywood to level off and subsequently decline.

Softwood plywood imports, less than 30 million square feet (3/8-inch basis) in all years except 1978, have not been a significant source of domestic supply and no change is assumed in the projection period.

Veneer imports have also increased fairly rapidly, moving up from around 400 million square feet (surface measure) in the early 1950's to an average of 2.3 billion square feet in the 1970's. Over four-fifths of this was hardwoods, and they are expected to continue to rise for use in domestic production of plywood.

Demand on U.S. mills for plywood.—Domestic plywood production in 1978 reached 20.7 billion board feet (3/8-inch basis), nearly five times the level of output in the early 1950's (table 3.26). Softwoods accounted for all of the growth as output increased from 2.7 billion square feet in 1950 to 19.5 billion square feet in 1978.

Projected demand for plywood produced by domestic industries with base level price trends rises rapidly to 26.4 billion square feet in 1990 and slowly thereafter to 30.9 billion in 2030. Most of the increase is for softwood plywood.

Board Consumption and Demand. Combined insulating board, hardboard, and particleboard consumption reached 13.5 billion square feet (3/8-inch basis) in 1976 and continued up to 16.5 billion in 1978 (tables 3.27 and 3.28; fig. 3.10). Consumption in 1978 was nearly five times the volume used in 1950. Per capita consumption also rose rapidly in this period, increasing from 22 to 75 square feet.

Although consumption of all three board products has increased in the past 25 years, particleboard has shown the most rapid growth, rising from less than 50 million square feet in 1950 to 6.9 billion square feet in 1976 and to 9.1 billion square feet in 1978 (fig. 3.10). Hardboard use also increased rapidly through the early 1970's, slowed somewhat, and then rose to a record 2.7 billion square feet in 1978. Insulating board consumption has been relatively more stable; however, this product still accounted for about 29 percent of combined board consumption in 1979.

In 1976, total board consumption was about equally divided between new housing, manufacturing, new nonresidential and residential upkeep and improvements, and all other uses. Among the types of boards, principal markets for insulating board were in construction while hardboard and particleboard were used in a wide range of applications and products in both construction and manufacturing. The fast growth in use of particleboard largely reflects the substitution of this product for lumber and plywood used as core stock in the manufacture of furniture, doors, and cabinets. Much of the growth in use since the late 1950's reflects similar substitution for floor underlayment and since the early 1970's the use of medium density fiberboard in furniture manufacture and thin particleboard in furniture and residential paneling.

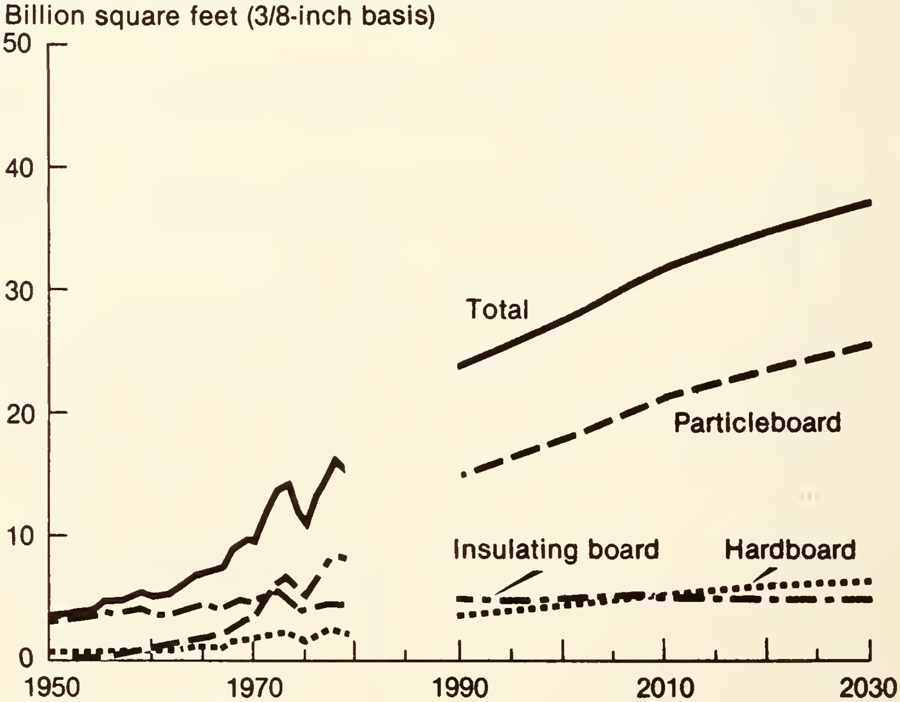
As noted in earlier sections of this chapter, numerous products such as composite particleboard-veneer panels, structural waferboards, structural particleboards, and oriented-strand boards are being developed or have recently entered U.S. markets. Structural waferboard, the consumption of which has grown from about 35 million square feet in 1970 to 400 million in 1978, is currently the most widely used of these products.[45] Although most is now imported from Canada, several U.S. plants are currently in production, under construction, or have been announced.[46]

These products are so new that data are not as yet available to establish

[45] Bonney. *Op. cit.*
[46] Anderson. *Op. cit.*

Figure 3.10

Board Consumption, 1950-79, with Projections* to 2030



*Base level price trends

Table 3.27—*Board consumption in the United States, by per capita use, type of board, and end use, 1962, 1970, and 1976, with projections (base level price trends) to 2030*

(⅜-inch basis)

Year	Total	Per capita	Type of board			End use				
			Insulating board	Hardboard	Particle-board[1]	New housing	Residential upkeep and im-provements	New non-residential construc-tion	Manufac-turing	All other[2]
	Million square feet	*Square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*
1962	5,590	30	3,844	930	816	2,213	([3])	([3])	([3])	([3])
1970	9,415	47	4,328	1,572	3,515	2,760	1,415	1,050	1,790	2,400
1976	13,523	63	4,492	2,105	6,927	3,510	2,160	1,095	3,480	3,278
Low projections[4]										
1990	22,810	97	4,720	3,490	14,600	6,535	3,510	2,150	5,310	5,305
2000	25,260	103	4,420	4,130	16,710	6,215	4,050	2,750	6,070	6,175
2010	29,000	116	4,690	5,020	19,290	6,825	4,800	3,350	6,805	7,220
2020	31,380	124	4,580	5,550	21,250	7,015	5,370	3,800	7,265	7,930
2030	32,290	130	4,270	5,610	22,410	5,695	6,050	4,210	7,695	8,640
Medium projections[4]										
1990	23,820	98	4,920	3,650	15,250	6,935	3,530	2,230	5,620	5,505
2000	27,300	105	4,770	4,490	18,040	7,005	4,120	2,920	6,660	6,595
2010	31,950	116	5,120	5,540	21,290	7,720	4,950	3,650	7,730	7,900
2020	34,670	120	4,900	6,090	23,680	7,380	5,550	4,250	8,610	8,880
2030	37,320	124	5,100	6,480	25,740	6,475	6,290	4,840	9,690	10,025
High projections[4]										
1990	24,790	97	5,120	3,780	15,890	7,335	3,560	2,310	5,890	5,695
2000	29,200	103	5,110	4,820	19,270	7,755	4,170	3,110	7,190	6,975
2010	35,400	112	5,710	6,200	23,490	9,075	5,150	3,990	8,590	8,595
2020	38,390	108	5,370	6,920	26,100	8,065	5,810	4,790	9,850	9,875
2030	43,250	110	5,540	7,570	30,140	8,280	6,710	5,560	11,310	11,390

[1]Includes waferboard, flakeboard, composite boards, and medium-density fiberboard.
[2]Includes upkeep and improvement of nonresidential buildings and structures; shipping; mining, made-at-home projects, such as furniture; made-on-the-job items, such as advertising and display structures; and a wide variety of other miscellaneous products and uses.
[3]Not available.
[4]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: See tables 3.8, 3.10, 3.12, 3.13, 3.16, 3.21, 3.22, and 3.28.

Projections: U.S. Department of Agriculture, Forest Service.

trends for projection; however, it seems reasonable to assume that consumption of structural panel products will increase in future decades, primarily as a substitute for conventional structural plywood. The development of these products reflects, in part, increasing costs of softwood stumpage, a situation that seems likely to continue in the decades ahead. [47] Structural flakeboards and particleboard can be manufactured from lower cost hardwoods and unutilized residues, resources which exist near the large eastern and midwestern housing markets. Although these raw materials will be increasingly in demand for lumber, pulpwood, and fuelwood, prospective supplies are large. Consequently, most factors point to continued fast growth for particleboards in the years ahead.

Much of the growth in hardboard consumption over the past 25 years also reflects its substitution for lumber and plywood in construction in such uses as siding, underlayment, and paneling and in furniture manufacture. In addition, markets have been expanded through technological advances in new board treatments and finishes. Insulating board, on the other hand, has been tied closely to construction markets. Consumption of these products should increase in future years with growth in their major market areas.

Board exports and imports.—U.S. exports and imports of insulating board, hardboard, and particleboard have been relatively small through most of the past 2½ decades (table 3.28). Until the early 1970's board exports totaled only 0.1 billion square feet (⅜-inch basis) and consisted almost entirely of insulating board. Beginning in 1972, there were small increases in hardboard and particleboard shipments; however, total board exports remained less than 5 percent of total production.

Imports of board products have also increased, on the average, in the 1970's, chiefly due to somewhat larger imports of hardboard and more recently particleboards from Canada. Total imports have also provided less than 5 percent of the total board consumed.

[47] See Chapter 8 for a discussion of prospective trends in timber availability, quality, and costs.

Table 3.28—*Board consumption, exports, imports, and production in the United States, specified years*

(⅜-inch basis)

Year	Consumption					Exports		
	Total board	Per capita	Insulating board	Hardboard	Particleboard[1]	Total board	Insulating board	Hardboard
	Billion square feet	*Square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*
1950	3.4	22	3.0	0.3	([2])	0.1	0.1	([2])
1955	4.6	28	4.0	.5	0.1	.1	.1	([2])
1960	5.1	28	3.8	.7	.5	.1	.1	([2])
1965	7.3	38	4.5	1.2	1.6	.1	.1	([2])
1970	9.4	46	4.3	1.6	3.5	.1	.1	([2])
1971	11.8	57	5.2	1.9	4.8	.2	.1	([2])
1972	13.7	66	5.3	2.2	6.2	.2	.1	([2])
1973	14.5	69	5.3	2.3	6.9	.3	.1	([2])
1974	12.5	59	4.3	2.1	6.0	.4	.1	0.1
1975	11.0	51	3.9	1.7	5.4	.3	.1	.1
1976	13.5	63	4.5	2.1	6.9	.3	.1	.1
1977	15.2	70	4.6	2.3	8.3	.3	.1	.1
1978	16.5	75	4.7	2.7	9.1	.2	.1	([2])
1979[3]	15.5	70	4.5	2.6	8.4	.3	.1	([2])
				Projections				
Year	Total demand					Exports		
1990	23.8	98	4.9	3.6	15.2	.4	.1	.1
2000	27.3	105	4.8	4.5	18.0	.4	.1	.1
2010	32.0	116	5.1	5.5	21.3	.6	.1	.2
2020	34.7	120	4.9	6.1	23.7	.6	.1	.2
2030	37.3	124	5.1	6.5	25.7	.6	.1	.2

[1]Includes waferboard, flakeboard, composite boards, medium-density fiberboard, and similar products.
[2]Less than 50 million square feet.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

These various trends are expected to continue in future decades and provide small and roughly offsetting volumes of 0.6 billion square feet for exports and 0.8 billion for imports.

Demand on U.S. mills for board.—As described above, domestic consumption of insulating board, hardboard, and particleboard has increased rapidly over the past 25 years, and because of the relatively small international trade in these products, most has been supplied by the domestic U.S. industries. A continuation of these trends is expected in the future. Total board production is projected to rise to 37.1 billion square feet by 2030, about 175 percent above output in 1976 (table 3.28). Although all products are expected to grow, most of the increase will be for particleboard, particularly the structural types.

A substantial part of the wood used for these products has come from the by-products of primary timber processing industries. However, nearly all of the wood going into primary processing plants is now used for some purpose (see Chapter 10). As a result, future wood demands must be met by increasing use of forest and urban residues and roundwood.

Demand for Pulpwood

Pulpwood consumption in domestic mills has increased almost fourteenfold since 1920, rising from 6.1 million cords to 83.5 million cords [48] (6.2 billion cubic feet) in 1979. In addition, export demand, including the pulpwood equivalent of pulp, paper, and board, increased almost 24 times to 13.7 mil-

[48] This included 51.3 million cords of roundwood and 32.2 million cords of chips and sawdust obtained from slabs, edgings, veneer cores, and other byproducts of primary manufacturing plants and an unknown quantity of logging residues.

In the last 50 years, pulpwood consumption in U.S. mills has increased from 13 to 82 million cords. In 2030, projected demands amount to 178 million cords.

1950–79, with projections (medium growth in population and economic activity—base level price trends) to 2030

(⅜-inch basis)

	Imports				Production			
Particleboard[1]	Total board	Insulating board	Hardboard	Particleboard[1]	Total board	Insulating board	Hardboard	Particleboard[1]
Billion square feet	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*
([2])	([2])	([2])	([2])	([2])	3.4	3.1	0.3	([2])
([2])	0.1	([2])	0.1	([2])	4.6	4.0	.5	0.1
([2])	.1	([2])	.1	([2])	5.0	3.8	.6	.5
([2])	.3	0.1	.2	([2])	7.1	4.5	1.0	1.6
([2])	.3	.1	.2	([2])	9.2	4.3	1.4	3.5
([2])	.4	.2	.2	([2])	11.6	5.1	1.7	4.8
0.1	.5	.2	.4	([2])	13.3	5.2	1.9	6.2
.2	.6	.2	.3	([2])	14.2	5.2	2.0	7.0
.2	.4	.1	.2	([2])	12.5	4.4	1.9	6.2
.2	.2	([2])	.1	([2])	11.2	3.9	1.7	5.5
.2	.3	.1	.2	0.1	13.5	4.5	2.0	7.0
.1	.7	.1	.2	.3	14.9	4.6	2.2	8.1
.1	.9	.2	.3	.4	15.9	4.6	2.5	8.8
.2	.9	.2	.3	.4	14.9	4.4	2.4	8.1
Projections								
	Imports				Demand on U.S. mills			
.2	.6	.1	.4	.1	23.6	4.9	3.3	15.3
.2	.6	.1	.4	.1	27.1	4.8	4.2	18.1
.3	.8	.1	.5	.2	31.6	5.1	5.2	21.4
.3	.8	.1	.5	.2	34.5	4.9	5.8	23.8
.3	.8	.1	.5	.2	37.1	5.1	6.2	25.8

Sources: Production: Insulation board and hardboard, 1950–79—U.S. Department of Commerce, Bureau of the Census. *Pulp, paper, and board.* Curr. Ind. Reps. Ser. M26A. Annual; Particleboard, 1950–75—U.S. Department of Commerce, Bureau of the Census. *Particleboard.* Curr. Ind. Reps., Ser. MA24L. Annual. 1976–79—National Particleboard Association. *Particleboard and medium density fiberboard, annual production and shipments.* Exports: U.S. Department of Commerce, Bureau of the Census. *U.S. exports: schedule B commodity by country.* FT 410. Monthly. Imports: U.S. Department of Commerce, Bureau of the Census. *U.S. Imports for consumption and general imports: TSUSA commodity by country by origin.* FT 246. Annual.

Projections: U.S. Department of Agriculture, Forest Service.

lion cords (0.8 billion cubic feet). As a result of such growth, about a third of the cubic volume of timber harvested from domestic forests is used as pulpwood.

Demand for pulpwood is a derived demand in the sense that it is determined by demands for paper, board, and other pulp products. Accordingly, the analysis below first considers trends in the use of these products. Demands for paper and board are then converted to requirements for wood pulp, waste paper, and other fibers. Projected demands for wood pulp are, in turn, converted to requirements for pulpwood.

Demand for Paper and Board. Consumption of paper and board has increased markedly in the past half century, rising from less than 8 million tons in 1920 to nearly 73 million tons in 1979 (table 3.29: fig. 3.11; Append. 1, table 1.17). The rate of growth, however, which averaged 4.8 percent (calculated from trend values) in the years 1920–40, slowed to about 3.2 percent in the 1950–79 period.

Per capita consumption of paper and board rose over 4.5 times between 1920 and 1979, increasing from 145 to 660 pounds (table 3.30). Rates of growth in per capita use also showed a substantial decline, dropping from an average of 2.8 percent, annually in the 20 years prior to World War II to 1.7 percent in the 1970's.

Factors affecting consumption.—Part of the growth in total paper and board consumption in past decades is attributable to increases in population, economic activity, and disposable personal income. Part is also the result of its substitution for lumber, veneer, and metals in such products as shipping containers. Development of new products to serve rapidly expanding markets such as the fast food, convenience food, and computer and copier industries also has contributed to increases in consumption.

The declining rate of growth in consumption, on the other hand, is partly due to the fact that per capita use of some grades of paper and board is beginning to level off as it moves toward a saturation level.[49] It also reflects stronger competition from materials that compete with paper and board. Use of plastics for packaging foods and other consumer goods, for milk containers, beverage cups, and

[49] For a discussion of the tendency of per capita consumption to approach a saturation value, see: U.S. Department of Agriculture, Forest Service. Use of regression equations for projecting trends in demand for paper and board. U.S. Department of Agriculture, Forest Res. Rep. 18, 178 p. 1967. Buongiorno, Joseph and Gerald L. Gronsenick. Impact of world economic and demographic growth on forest product consumption and wood requirements. Canadian J. Forest Res. 7(2):392–399, 1977.

many other products, for example, has dampened the demand for several grades of paper and board. The information processing revolution now seemingly underway also may affect demands for writing and printing papers in the future.

In projecting demands for paper and board, it seems likely that continued penetration of competitive materials in many market areas will be limited by ultimate scarcities and rising prices of raw materials such as petroleum, together with environmental factors relating to manufacturing pollution, and problems of disposal of nonbiodegradable products. Such a prospect appears especially likely over the range in which the prices of paper and board can reasonably be expected to increase in the next few decades. Although substitution may be limited in the projection period, it nonetheless seems likely that the rate of growth in consumption—especially on a per capita basis—will continue to decline as consumption approaches some maximum or saturation level for different products and uses.

Table 3.29—*Paper and board consumption in the United States, specified years 1920–79, with projections of demand (base level price trends) to 2030*

Year	Total paper and board		Paper		Paperboard[1]		Insulating board and hardboard	
	Total	Annual rate of change	Total	Annual rate of change	Total	Annual rate of change	Total	Annual rate of change
	Million tons	*Percent*	*Million tons*	*Percent*	*Million tons*	*Percent*	*Million tons*	*Percent*
1920	7.7	.....	5.4	.....	2.3	.....	.....	.....
1925	10.4	6.2	7.1	5.6	3.2	6.8	0.1	.....
1930	12.3	3.4	8.4	3.4	3.8	3.5	.1	.....
1935	12.8	.8	8.2	−.5	4.5	3.4	.1	.....
1940	16.8	5.6	10.6	5.3	6.0	5.9	.2	14.9
1945	19.8	3.3	11.0	.7	7.9	5.7	.9	35.1
1950	29.1	8.0	16.8	8.8	11.0	6.8	1.2	5.9
1955	34.8	3.6	19.3	2.8	13.8	4.6	1.7	7.2
1960	39.2	2.4	22.0	2.7	15.4	2.2	1.9	2.2
1965	49.2	4.6	26.8	4.0	19.9	5.3	2.6	6.5
1970	58.1	3.4	31.7	3.4	23.5	3.4	2.8	1.5
1971	59.6	2.6	32.3	1.9	23.9	1.7	3.4	21.4
1972	64.5	8.2	34.4	6.5	26.4	10.5	3.8	11.8
1973	66.9	3.7	35.7	3.8	27.3	3.4	3.9	2.6
1974	64.7	−3.3	35.5	−.6	25.7	−5.9	3.5	−10.3
1975	56.0	−13.4	30.1	−15.2	22.8	−11.3	3.1	−11.4
1976	64.0	14.3	34.5	14.6	25.9	13.6	3.6	16.1
1977	67.3	5.2	36.5	5.8	27.0	4.2	3.8	5.6
1978	70.7	5.1	38.4	5.2	28.1	4.1	4.1	7.9
1979[2]	72.8	3.0	40.1	4.4	28.7	2.1	3.9	−4.9
Low projections[3]								
1990	95.6	2.9	48.8	2.5	41.6	3.4	5.2	2.5
2000	113.0	1.7	57.4	1.6	49.9	1.8	5.7	.9
2010	130.7	1.5	65.6	1.3	58.3	1.6	6.8	1.8
2020	145.4	1.1	73.0	1.1	65.1	1.1	7.3	.6
2030	157.0	.8	78.7	.8	71.1	.9	7.2	−.1
Medium projections[3]								
1990	100.3	3.2	51.1	2.9	43.8	3.8	5.4	2.7
2000	123.4	2.1	62.5	2.0	54.7	2.2	6.2	1.4
2010	147.8	1.8	74.3	1.7	66.1	1.9	7.4	1.8
2020	171.8	1.5	86.3	1.5	77.6	1.6	7.9	.7
2030	194.6	1.3	97.6	1.2	88.6	1.3	8.4	.6
High projections[3]								
1990	105.7	3.6	53.9	3.3	46.2	4.2	5.6	3.0
2000	135.5	2.5	68.6	2.4	60.2	2.7	6.7	1.8
2010	170.4	2.3	85.7	2.3	76.4	2.4	8.3	2.2
2020	209.4	2.1	105.5	2.1	94.9	2.2	9.0	.8
2030	251.5	1.8	126.9	1.9	114.9	1.9	9.7	.8

[1]Includes wet machine board.
[2]Preliminary.
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Curr. Ind. Reps. Ser. M26A. Annual, *U.S. exports: schedule B commodity by country.* FT 410. Monthly, *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 146. Annual; American Paper Institute. *Statistics of paper and paperboard,* Annual. New York.

Projections: U.S. Department of Agriculture, Forest Service.

Relationships Between Paper and Board Consumption and Economic Variables. In the past, the rates of growth in consumption of the major grades of paper and board have been quite different. Such differences have resulted from the development of new pulp-based products, inroads of substitutes, varying rates of growth in major sectors of the economy, and other factors such as changes in consumer tastes.

In partial recognition of these differences, the various types and grades of paper and board have been grouped into three categories—paper, paperboard, and insulating board and hardboard—which have a common relationship to one or more of the basic determinants of demand discussed in Chapter 2 (see Append. 1, tables 1.18-1.20 for historical statistics for these categories).

Because most paper is consumed in one form or another by individuals, with the levels of use a function of income, there has been a close statistical relationship between changes in per capita consumption of paper and changes in per capita disposable income.[50] In the case of paperboard, which is used primarily for packaging industrial and agricultural commodities, consumption has shown a close relationship to changes in the gross national product. Most of the growth in the consumption of insulating board and hardboard, which is used in con-

[50] The choice of independent variable, base time period, units of measurement, form of equation, and kind of equation used in this analysis for projecting demands for paper and paperboard were based on guides developed in the study Use of regression equations for projecting trends in demand for paper and board, Op. cit.

struction for such purposes as sheathing and underlayment and in manufacturing, has been associated with changes in those sectors of the economy.

Projected demands for paper and board.—On the basis of past relationships and trends in use, total demand for paper and board with base level price trends is projected to rise to 100.3 million tons (medium level) in 1990 and to 194.6 million tons in 2030—more than triple consumption in 1976 (table 3.29; fig. 3.11).[51] Projections of per capita demand also rise rapidly, reaching 824 pounds in 1990 and 1,296 pounds in 2030 (table 3.30).

Annual rates of growth in both the total and per capita demands for paper and board show susbtantial declines over the projection period. For per capita demand, for example, the average falls from 2.3 percent between 1976 and 1990 to 0.9 in the 2020's.

Effects of the alternative assumptions on growth in population and economic activity are substantial, with projected total demand for paper and board ranging from 157 million tons to 252 million tons in 2030 (table 3.29).

Exports of paper and board.—Exports of paper and board, though small in relation to U.S. production, rose fairly rapidly in the 1960's and early 1970's to a peak of 3.5 million tons in 1974 (table 3.31; Append. 1, tables 1.17-1.20). Since 1974, total exports have fluctuated between 2.9 and 3.2 million tons. Exports of nearly all grades of paper and board in the 1960's and early 1970's showed some increase, but kraft linerboard accounted for by far the largest part of the growth.

In the 1960's and early 1970's exports of paper and board to all regions of the world rose but shipments to Canada, Japan, western Europe and Central and South America grew especially fast (Append. 2, table 2.9).

As discussed in detail in Chapter 4, the available data on future demands in the major consuming countries and regions of the world suggest the likelihood of substantial growth in exports of paper and board products in the decades ahead. For example, European import demands for fiber-based products are projected to about double between the mid-1970's and 2000, and demands in Japan, Canada, and Central and South America are also likely to rise fairly rapidly. Many of these countries have substantial forest resources, that along with development of domestic timber processing facilities, could affect future levels of U.S. exports. However, the relatively favorable supply situation in the United States and projected increases in demand, particularly in western Europe and Japan,

[51] The medium projection of demand for total paper and paperboard in 1990 in this analysis agrees closely with these presented in: United Nations, Food and Agriculture Organization. FAO world pulp and paper consumption outlook. Phase I. world outlook for paper and board. Rome. 93 p. 1977.

Table 3.30—*Paper and board per capita consumption in the United States, specified years 1920–79, with projections of demand (base level price trends) to 2030*

Year	Total paper and board		Paper		Paperboard[1]		Insulating board and hardboard	
	Total	Annual rate of change	Total	Annual rate of change	Total	Annual rate of change	Total	Annual rate of change
	Pounds	*Percent*	*Pounds*	*Percent*	*Pounds*	*Percent*	*Pounds*	*Percent*
1920	145	....	102	....	43	....	..	....
1925	180	4.4	123	3.8	56	5.4	1	....
1930	201	2.2	137	2.2	62	2.1	2	14.9
1935	201	....	129	−1.2	71	2.7	1	−12.9
1940	254	4.8	161	4.5	91	5.1	2	14.9
1945	283	2.2	157	−.5	113	4.4	13	45.4
1950	382	6.2	221	7.1	145	5.1	16	4.2
1955	420	1.9	233	1.1	166	2.7	20	4.6
1960	434	.7	243	.8	170	.5	21	1.0
1965	507	3.2	276	2.6	205	3.8	26	4.4
1970	567	2.3	309	2.3	230	2.3	28	1.5
1971	576	1.6	312	1.0	231	.4	33	17.9
1972	618	7.3	329	5.4	253	9.5	36	9.1
1973	636	2.9	339	3.0	260	2.8	37	2.8
1974	610	−4.1	335	−1.2	243	−6.5	33	−10.8
1975	524	−14.1	282	−15.8	213	−12.3	29	−12.1
1976	594	13.4	320	13.5	240	12.7	34	17.2
1977	621	4.5	336	5.0	249	3.8	35	2.9
1978	646	4.0	351	4.5	257	3.2	38	8.6
1979[2]	660	2.2	364	3.7	260	1.2	35	−7.9
Low projections[3]								
1990	809	2.2	413	1.8	352	2.6	44	1.9
2000	919	1.3	467	1.2	406	1.4	46	.4
2010	1,042	1.3	523	1.1	465	1.4	54	1.6
2020	1,149	1.0	577	1.0	515	1.0	58	.7
2030	1,260	.9	631	.9	570	1.0	58	0
Medium projections[3]								
1990	824	2.3	420	2.0	360	2.9	44	1.9
2000	948	1.4	480	1.5	420	1.7	48	.8
2010	1,074	1.3	540	1.2	480	1.4	54	1.2
2020	1,184	1.0	595	1.0	535	1.2	54	0
2030	1,296	.9	650	.9	590	1.0	56	.4
High projections[3]								
1990	830	2.4	423	2.0	363	3.0	44	1.9
2000	958	1.4	485	1.4	426	1.6	47	.7
2010	1,082	1.2	544	1.2	485	1.3	53	1.2
2020	1,183	.9	596	.9	536	1.0	51	−.4
2030	1,281	.8	646	.8	585	.9	49	−.4

[1]Includes wet machine board.
[2]Preliminary.
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: See tables 2.1 and 3.29.

Projections: U.S. Department of Agriculture, Forest Service.

suggest continued and fairly rapid growth in paper and board exports to 6.0 million tons in 2030, about double the current volume.

Imports of paper and board.—U.S. imports of paper and board, which are substantially larger than exports, have risen fairly rapidly to a level of 9.3 million tons in 1978 and 1979, (table 3.31; Append. 1, tables 1.17-1.20). Newsprint has composed more than two-thirds of the total imports of paper and board since before 1920. However, in recent years, some other grades, particularly building board, have increased in relative importance.

Canada provided nearly all of U.S. imports of newsprint in 1979 as well as the major portion of most other grades (Append. 2, table 2.3).

Canadian newsprint producers have historically captured a major share of U.S. markets, because of the availability of spruce, a species preferred for newsprint manufacture. With advances in pulping technology, however, the U.S. newsprint industry has grown since World War II to the point where domestic mills account for about a third of U.S. consumption. This trend is expected to continue. In addition, although there is potential for increased production in Canada, Canadian do-

Figure 3.11

Paper and Board Consumption, 1920-79, with Projections to 2030

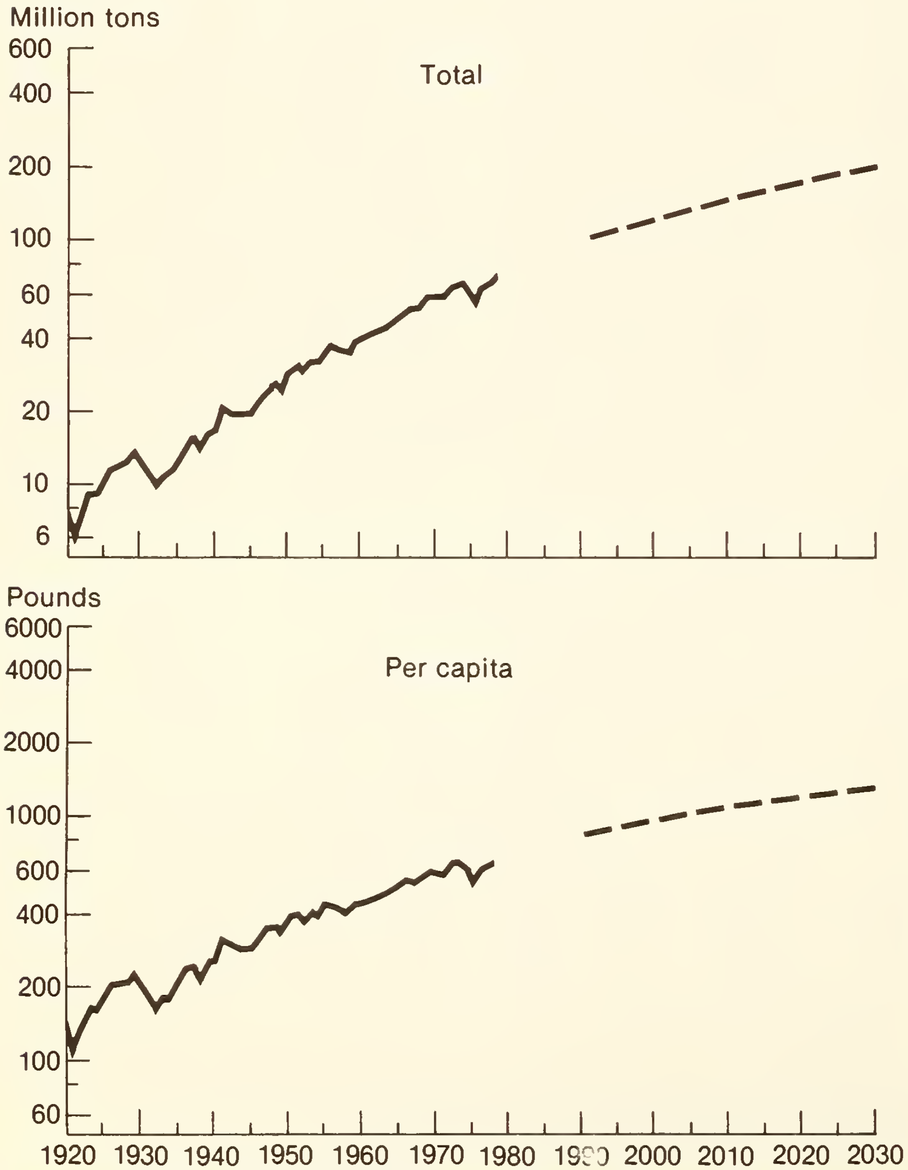


Table 3.31—*Paper and board consumption, exports, imports, and production in the United States, specified years 1920–79, with projections (base level price trends) to 2030*

(Million tons)

Year	Consumption	Exports	Imports	Production
1920...	7.7	0.2	0.8	7.2
1925...	10.4	.1	1.5	9.0
1930...	12.3	.2	2.3	10.2
1935...	12.8	.1	2.4	10.5
1940...	16.8	.5	2.8	14.5
1945...	19.8	.4	2.8	17.4
1950...	29.1	.3	5.0	24.4
1955...	34.8	.7	5.4	30.2
1960...	39.2	.9	5.7	34.4
1965...	49.2	1.6	6.8	44.1
1970...	58.1	2.7	7.2	53.5
1971...	59.6	3.0	7.5	55.1
1972...	64.5	2.9	8.0	59.5
1973...	66.9	2.8	8.4	61.3
1974...	64.7	3.5	8.3	59.9
1975...	56.0	2.9	6.3	52.5
1976...	64.0	3.2	7.2	59.9
1977...	67.3	3.0	7.6	62.7
1978...	70.7	2.9	9.3	64.3
1979[1] ..	72.8	3.1	9.3	66.6

Low projections[2]

Year	Total demand	Exports	Imports	Demand on U.S. mills
1990...	95.6	4.5	9.3	90.8
2000...	113.0	4.9	10.3	107.6
2010...	130.7	5.3	11.2	124.8
2020...	145.4	5.7	12.0	139.1
2030...	157.0	6.0	12.7	150.3
Medium projections[2]				
1990...	100.3	4.5	9.3	95.5
2000...	123.4	4.9	10.3	118.0
2010...	147.8	5.3	11.2	141.9
2020...	171.8	5.7	12.0	165.5
2030...	194.6	6.0	12.7	187.9
High projections[2]				
1990...	105.7	4.5	9.3	100.9
2000...	135.5	4.9	10.3	130.1
2010...	170.4	5.3	11.2	164.5
2020...	209.4	5.7	12.0	203.1
2030...	251.5	6.0	12.7	244.8

[1]Preliminary.
[2]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: See table 3.29.

Projections: U.S. Department of Agriculture, Forest Service.

mestic markets are likely to grow rapidly and there will be increasing demands for Canadian pulp, paper, and board from Japan and western Europe.

In the 1947-76 period, there was a close statistical relationship between paper and board imports and domestic consumption. Projections based on this relationship and the various factors discussed above, and with a continuation of base level price trends, show paper and board imports continuing to rise, reaching 12.7 million tons in 2030. Although this is a substantial increase, the rates of growth drop throughout the projection period.[52]

Demand on U.S. mills for paper and board.—Production of paper and board in U.S. mills has increased rapidly in recent decades to 66.6 million tons in 1979 (table 3.31). Meeting projected domestic and export demands with base level price trends after allowing for imports, would require an increase in domestic production (demand on U.S. mills) to about 118 million tons by 2000 (medium projection), and to 187.9 million tons in 2030.

Annual growth rates for domestic production of paper and board averaged almost 3.5 percent between 1960 and 1979. Projected increases in demand on U.S. mills (medium level—base level price trends) average only 2.8 percent before 2000 and about 1.6 percent between 2000 and 2030.

Despite the drop in rates of growth, projected increases in demand on U.S. mills will require a very large expansion of the domestic paper and board industry in the next five decades. Between 1979 and 2030, the medium projection of demands increases by about 2.4 million tons a year. Since World War II, production has increased about 1.4 million tons a year.

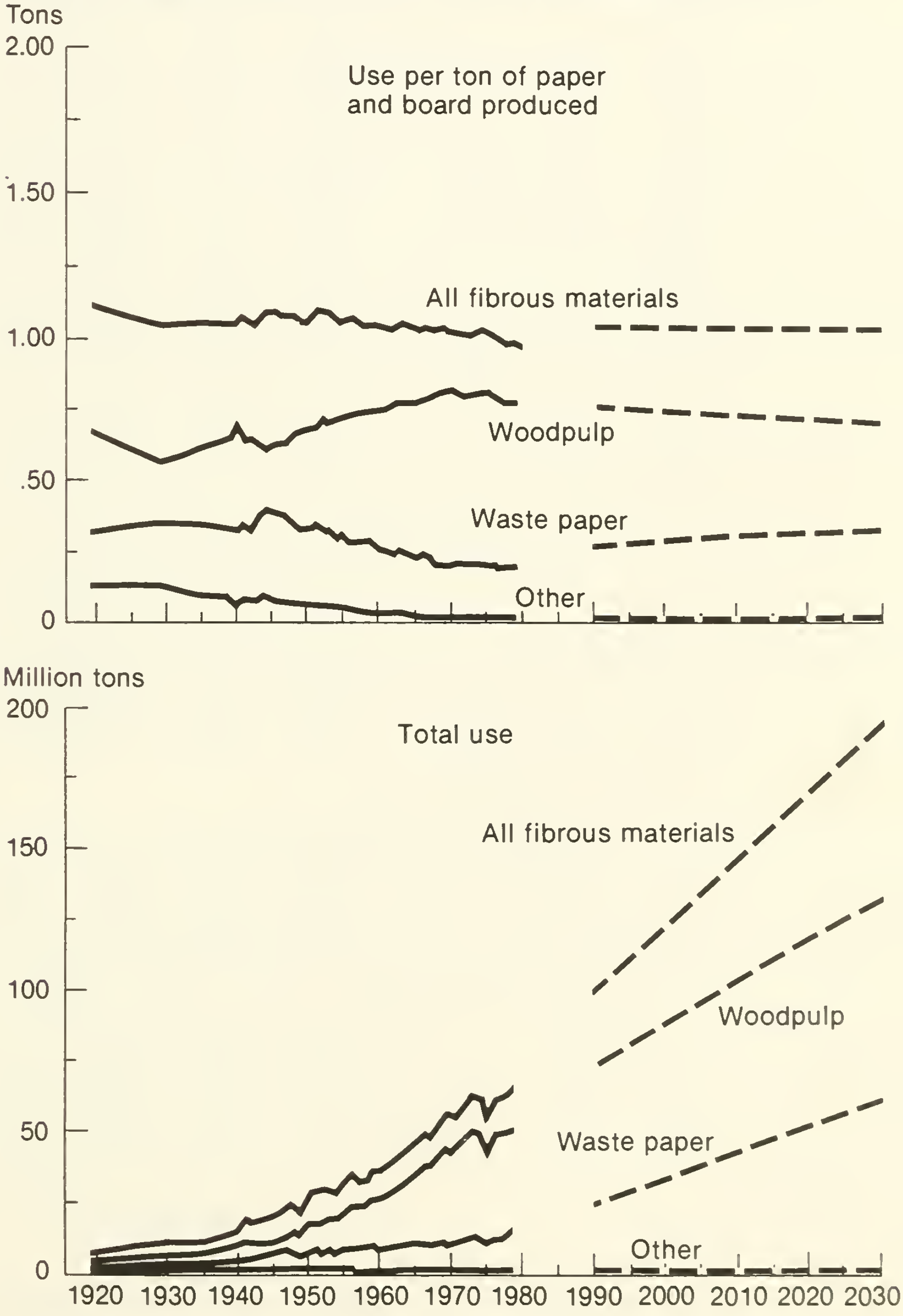
With higher prices in prospect under the equilibrium price assumptions, demand on U.S. mills would be lowered somewhat (see Chapter 8) because of a reduction in total demand and an increase in imports. Demands on U.S. mills would still involve a much larger expansion of U.S. industry than has been experienced in the past.

Demand for Wood Pulp. The manufacture of the 66.6 million tons of paper and board produced in the United States in 1979 required some 65.3 million tons of fibrous material, including some 51.6 million tons of wood pulp, 12.9 million tons of waste paper, and 0.7 million tons of cotton, bagasse, and other fibers (table 3.32, fig. 3.12; Append. 1, table 1.21). The trend in consumption of all fibrous material has closely paralleled the trend in paper and board production, doubling since 1955 and increasing nearly tenfold since 1919.

In contrast to this upward trend, average use of fibrous materials per ton of paper and board produced has been declining very slowly (fig. 3.12). It was assumed that this trend would continue in the projection period.[53]

Figure 3.12

Fibrous Material Used in the Manufacture of Paper and Board, Selected Years 1919-79, with Projections to 2030



[52] As discussed in Chapter 8, somewhat higher imports of pulp, paper and board products, particularly from Canada, could be expected with the higher prices in prospect in future years.

[53] The projected increase in the use of waste paper per ton of paper and board produced discussed below would tend to raise this average. However, it was assumed that this would be offset by increasing use of nonfiber additives and improvements in technology.

Although there has been relatively little change in the total use of fibrous materials per ton of production, there have been major shifts in the mix of fibers consumed. Since the late 1940's, for example, new wood pulp has risen from roughly two-thirds to four-fifths of the total fibrous materials used. Use of waste paper, on the other hand, declined from about 35 percent of the total fibers used to around 20 percent. Use of other fibers dropped from about 6 percent to 1 percent.

The sharp upward trend in use of new wood pulp, and the concomitant decline in the proportion of waste paper used, reflect many technical and economic factors. For example, use of new wood pulp results in relatively strong and lightweight paper and board products. New wood pulps are relatively free of biological and other contaminants. Integration of the industry with production of both pulp and paper concentrated in large complexes designed to fully utilize the timber harvested has tended to favor production of virgin pulps over waste paper reuse. Use of recycled fibers also has been inhibited by high costs of collecting, sorting, cleaning, and transporting waste paper.

Table 3.32—*Fibrous material used in the manufacture of paper and board in the United States, specified years 1919–79, with projections (base level price trends) to 2030*

Year	Fibrous material used				Fibrous material used per ton of paper and board produced			
	Total	Wood-pulp	Waste paper	Other	Total	Wood-pulp	Waste paper	Other
	Million tons	*Million tons*	*Million tons*	*Million tons*	*Tons*	*Tons*	*Tons*	*Tons*
1919	6.6	4.0	1.9	0.7	1.110	0.674	0.311	0.125
1929	11.6	6.3	3.8	1.4	1.039	.565	.345	.129
1935	11.0	6.4	3.6	1.0	1.050	.615	.342	.092
1939	14.2	8.7	4.4	1.2	1.049	.640	.323	.086
1940	15.5	9.8	4.7	1.0	1.070	.675	.322	.072
1945	19.0	10.8	6.8	1.3	1.092	.623	.391	.077
1950	25.9	16.5	8.0	1.4	1.062	.677	.326	.059
1955	31.8	21.5	9.0	1.3	1.056	.711	.300	.045
1960	35.7	25.7	9.0	1.0	1.036	.746	.262	.028
1965	45.1	34.0	10.2	.9	1.023	.771	.232	.020
1970	54.6	43.2	10.6	.8	1.021	.807	.198	.015
1971	56.0	44.1	11.0	.9	1.017	.801	.200	.016
1972	59.9	47.3	11.7	.9	1.008	.796	.197	.015
1973	62.0	48.8	12.4	.9	1.012	.796	.202	.014
1974	61.3	48.3	12.1	.8	1.022	.807	.202	.014
1975	53.4	42.4	10.4	.6	1.017	.808	.197	.012
1976	60.2	47.5	11.9	.7	1.004	.794	.198	.012
1977	61.4	48.5	12.1	.8	.979	.773	.193	.013
1978	63.3	49.8	12.6	.9	.984	.775	.196	.013
1979[1]	65.3	51.6	12.9	.7	.980	.775	.194	.011
				Low projections[2]				
Year	Demand for fibrous materials				Consumption of fibrous materials per ton of paper and board produced			
1990	91.7	69.0	21.8	.9	1.010	.760	.240	.010
2000	107.6	79.6	26.9	1.1	1.000	.740	.250	.010
2010	123.6	89.9	32.5	1.2	.990	.720	.260	.010
2020	136.3	98.8	36.1	1.4	.980	.710	.260	.010
2030	147.3	105.2	40.6	1.5	.980	.700	.270	.010
				Medium projections[2]				
1990	96.5	72.6	22.9	1.0	1.010	.760	.240	.010
2000	118.0	87.3	29.5	1.2	1.000	.740	.250	.010
2010	140.5	102.2	36.9	1.4	.990	.720	.260	.010
2020	162.2	117.5	43.0	1.7	.980	.710	.260	.010
2030	184.1	131.5	50.7	1.9	.980	.700	.270	.010
				High projections[2]				
1990	101.9	76.7	24.2	1.0	1.010	.760	.240	.010
2000	130.1	96.3	32.5	1.3	1.000	.740	.250	.010
2010	162.8	118.4	42.8	1.6	.990	.720	.260	.010
2020	199.0	144.2	52.8	2.0	.980	.710	.260	.010
2030	239.9	171.4	66.1	2.4	.980	.700	.270	.010

[1]Preliminary.

[2]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Curr. Ind. Reps. Ser. M26A. Annual; American Paper Institute. *Wood pulp statistics.* Annual. New York. 1972.

Projected use of waste paper.—A number of factors and concerns have developed in recent years that point to the likelihood of future growth in waste paper recycling. These include concern about the environment, problems of solid waste disposal, and increasing competition for timber. Federal and other agencies have modified purchase specifications, various forms of assistance or regulation are being considered, and research is being increased to identify ways of increasing reuse of waste paper.

Despite these various efforts, use of waste paper as a proportion of total fibrous materials is likely to increase only slowly because of the probable types of paper and board demanded, and prospective increases in costs of waste paper collection, sorting, cleaning, and transporting likely in future years.

Use of recycled fibers per ton of paper and board produced has therefore been assumed to rise from 0.19 ton to 0.25 ton by 2000 and to 0.27 ton by 2030. The latter level is about a third below the current rates in Japan and West Germany.[54] It is also under the rate achieved for a time in the United States during World War II. Projected use of new wood pulp drops from 0.77 ton in 1979 to 0.70 ton in 2030. Although other materials, such as bagasse, straw, and cotton linters, will continue to be used to some ex-

[54] Iannozzi, F. D. and L. M. Firth. Waste paper recovery comparison of U.S. rates with those of selected foreign countries. Tappi 61(6):23–26. 1978.

tent, combined consumption of other fibrous materials per ton is expected to show little change.

Total demand for waste paper, given the above rates, would rise from about 12.9 million tons in 1979 to 29.5 million tons by 2000 and to 50.7 million tons by 2030. Such projected reuse in 2030 could be close to a practical maximum considering availability and cost factors. Part of the paper and board consumed for such purposes as books and records is not available for recycling. Other parts are scattered or in locations remote from recycling plants, so badly contaminated as to prohibit reuse, or destroyed by the first use.

Projected demand for wood pulp for paper and board.—Under the above assumptions on future fiber mix, the medium projection of demand for wood pulp for production of paper and board in the United States with base level price trends rises from 51.6 million tons in 1979 to 87.2 million tons by 2000 and 131.5 million tons in 2030. This would require an average annual increase in wood pulp consumption of about 1.7 million tons a year between 1979 and 2000 and 1.5 million tons a year for the remainder of the projection period.

As in the case of paper and board, rates of increase in projected demand for wood pulp for the domestic manufacture and board fall rather sharply over the projection period.

Demand for wood pulp in nonpaper products.—In addition to pulp used in the manufacture of paper and board, about 0.9 million tons of wood pulp was used in 1979 for products such as rayon, cellulose acetate, and plastics. This was below the peak of 1.5 million tons attained in 1969, but some 3.3 times consumption in 1940 (table 3.33). Per capita use has also doubled since 1940.

Primarily on the basis of trends in recent per capita use, demand (medium level—base level price trends) was projected to amount to about 1.0 million tons in 1990 and remain at that level through the projection period. Per capita use shows a small decline, dropping from 8 pounds in 1979 to 7 pounds in 2010 and subsequent decades.

Total projected U.S. demand for wood pulp.—Apparent consumption of wood pulp in the manufacture of both paper and board and nonpaper products in the United States totaled 52.0 million tons in 1979 (table 3.34; Append. 1, table 1.22). The medium projection of demand with base level price trends reaches 132.5 million tons by 2030—a 2.5-fold increase over 1979. Annual rates of growth decline from 3.6 percent between 1960 and 1979 to 1.7 percent in the last decade of the projection period.

Exports of wood pulp.—In addition to domestic demand, a significant export market for wood pulp has developed in recent decades. Between 1950 and 1970, for example, wood pulp exports rose from 0.1 million to 3.1 million tons (table 3.34; Append. 1, table 1.22). After peaking in 1970, exports fluctuated between 2.2 and 2.9 million tons through 1979. Most of the growth in the 1960's was in sulphate and special alpha pulps. Together, they curretly compose about four-fifths of the total. Although wood pulp is shipped to all parts of the world, the largest volumes go to western Europe, the Far East—chiefly Japan, Korea, and India—and Latin America (Append. 2, table 2.8).

Various studies point to rapid and continuing increases in world demands for pulp and paper and board (see Chapter 4). These studies also indicate that available timber supplies may not be large enough to meet these rising demands. Consequently, although expanded export markets for U.S. pulp can be expected, it was assumed that because of increasing U.S. demands, the tightening timber supply situation in the United States as described in Chapters 7 and 8, and possible increases in fiber supplies from other regions of the world, wood pulp exports would rise relatively slowly to 4.3 million tons in 2030, an annual increase of about 1.0 percent from levels in the mid-1970's.

Table 3.33—*Woodpulp used in the manufacture of nonpaper products in the United States, specified years 1940–79, with projections of demand (base level price trends) to 2030*

Year	Total	Per capita
	Thousand tons	*Pounds*
1940	278	4
1945	527	8
1950	703	9
1955	826	10
1960	869	10
1965	1,170	12
1970	1,079	11
1971	1,116	11
1972	1,118	11
1973	1,047	10
1974	1,152	11
1975	785	7
1976	886	8
1977	879	8
1978	884	8
1979[1]	913	8
Low projections[2]		
1990	970	8
2000	945	8
2010	910	7
2020	875	7
2030	830	7
Medium projections[2]		
1990	1,000	8
2000	1,000	8
2010	1,000	7
2020	1,000	7
2030	1,000	7
High projections[2]		
1990	1,045	8
2000	1,085	8
2010	1,145	7
2020	1,220	7
2030	1,300	7

[1]Preliminary.
[2]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data for 1940–50 not strictly comparable with those for later years.

Sources: 1940–50—American Paper Institute. *Wood pulp statistics.* Annual. New York., 1955–79—U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Curr. Ind. Reps. Ser. M26A. Annual.

ports, the United States has long imported substantial volumes of wood pulp (table 3.34; Append. 1, table 1.22). Pulp imports approached 2 million tons in the 1920's—a level that with some fluctuation was maintained through the 1950's. In the 1960's, however, pulp imports rose fairly rapidly, and in the late 1960's and 1970's ranged between 3.5 and 4.3 million tons a year. In earlier years Scandinavia provided much of the imports, but in 1979, nearly all came from Canada (Append. 2, table 2.2).

As indicated in the discussion of the Canadian situation in Chapter 4, Canada has the physical potential for increases in timber harvests and for the associated increases in timber products output in the years before 2000. Although the harvest of timber suitable for the economic manufacture of lumber may be approaching a limit by that time, it is expected that Canadian forests, partly through improvements in utilization, can continue to support substantial increases in exports of pulp

Table 3.34—*Woodpulp consumption, exports, imports, and production in the United States, specified years 1920–79, with projections (base level price trends) to 2030*

(*Million tons*)

Year	Consumption	Exports	Imports	Production
1920...	4.7	(1)	0.9	3.8
1925...	5.6	(1)	1.7	4.0
1930...	6.4	(1)	1.8	4.6
1935...	6.7	0.2	1.9	4.9
1940...	9.7	.5	1.2	9.0
1945...	11.8	.1	1.8	10.2
1950...	17.1	.1	2.4	14.8
1955...	22.3	.6	2.2	20.7
1960...	26.6	1.1	2.4	25.3
1965...	35.7	1.4	3.1	34.0
1970...	44.0	3.1	3.5	43.5
1971...	45.2	2.2	3.5	43.9
1972...	48.2	2.3	3.7	46.8
1973...	50.0	2.3	4.0	48.3
1974...	49.7	2.8	4.1	48.3
1975...	43.4	2.8	3.1	43.1
1976...	48.9	2.5	3.7	47.7
1977...	50.4	2.6	3.9	49.1
1978...	51.4	2.6	4.0	50.0
1979[2]..	52.0	2.9	4.3	50.6

Year	Total demand	Exports	Imports	Demand on U.S. mills
Low projections[3]				
1990...	70.0	3.2	5.2	68.0
2000...	80.5	3.7	6.1	78.1
2010...	90.8	4.0	7.0	87.8
2020...	99.7	4.2	7.6	96.3
2030...	106.0	4.3	7.9	102.4
Medium projections[3]				
1990...	73.6	3.2	5.2	71.6
2000...	88.3	3.7	6.1	85.9
2010...	103.2	4.0	7.0	100.2
2020...	118.5	4.2	7.6	115.1
2030...	132.5	4.3	7.9	128.9
High projections[3]				
1990...	77.7	3.2	5.2	75.7
2000...	97.4	3.7	6.1	95.0
2010...	119.5	4.0	7.0	116.5
2020...	145.4	4.2	7.6	142.0
2030...	172.7	4.3	7.9	169.1

[1]Less than 50,000 tons.
[2]Preliminary.
[3]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Curr. Ind. Reps. Ser. M26A. Annual. *U.S. exports: schedule B commodity by country.* FT 410. Monthly, *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.; American Paper Institute. *Wood pulp statistics.* Annual. New York. 1972.

Projections: U.S. Department of Agriculture, Forest Service.

and paper products. Thus, U.S. imports of wood pulp are projected to rise, although relatively slowly to 7.9 million tons in 2030, about double imports in the 1970's.

Demand on U.S. mills for wood pulp.—When projected pulp imports are subtracted from total domestic and export demands, an estimated 85.9 million tons (medium projection—base level price trends) of wood pulp would be demanded from U.S. mills by 2000, with a further rise to 128.9 million tons in 2030.

Annual rates of growth in demand drop throughout the projection period. For example, with the medium projections in population and economic growth, rates drop from 1.9 percent in the 1990's to 1.1 percent in the decade after 2020. Part of the slowing in growth reflects the anticipated decline in use of new wood pulp per ton of paper and board manufactured discussed above.

Projected increases (medium projection—base level price trends) indicate it would be necessary to expand U.S. wood pulp production by about 1.4 million tons a year over the projection period. This would be close to the average increase between 1960 and 1976.

Pulpwood Consumption and Projected Demand. Consumption of pulpwood in U.S. mills to produce the tonnage of pulp shown in table 3.34 increased from 6.1 million cords in 1920 to 83.5 million cords in 1979 (table 3.35, fig. 3.13; Append. 1, table 1.23).

Softwoods have long been preferred for many pulp and paper products because of such factors as relatively higher strength properties and lighter color. In recent decades, however, use of hardwoods has increased rapidly. For example, in 1950 less than 15 percent of the pulpwood used in U.S. mills was from hardwood species; but by the late 1970's, hardwoods composed more than 25 percent of the total consumed. Such trends have resulted from technological improvements in pulping, availability of substantial volumes of hardwood at relatively lower costs per ton of fiber, improvements in properties of many grades of paper and board with the addition of hardwood pulps, and rising competition and prices for softwood timber.[55] The trend toward increased use of hardwoods is likely to be encouraged by a comparatively favorable supply situation, as indicated by the timber demand-supply comparisons in Chapter 8.

Based on these recent trends and probable continuing changes in technology, the proportion of hardwood fiber used in U.S. mills continues to rise, reaching 32 percent in 2000 and 38 percent in 2030.

Pulpwood used per ton of pulp.—Since 1920, average use of pulpwood per ton of pulp produced has not changed significantly, averaging about 1.6 cords per ton (fig. 3.14; Append. 1, table 1.23). During this period, some technological developments have tended to increase yields of pulp per cord of wood consumed. These have included a major shift from sulfite and soda processes to higher yielding sulfate, semichemical and, more recently refiner mechanical and thermomechanical processes.[56] The large relative increase in use of hardwoods has also been important because they yield more pulp per cord than softwoods. Offsetting these trends, however, has been an increase in proportions of semibleached and bleached grades of wood pulp which require more wood per ton than unbleached grades.

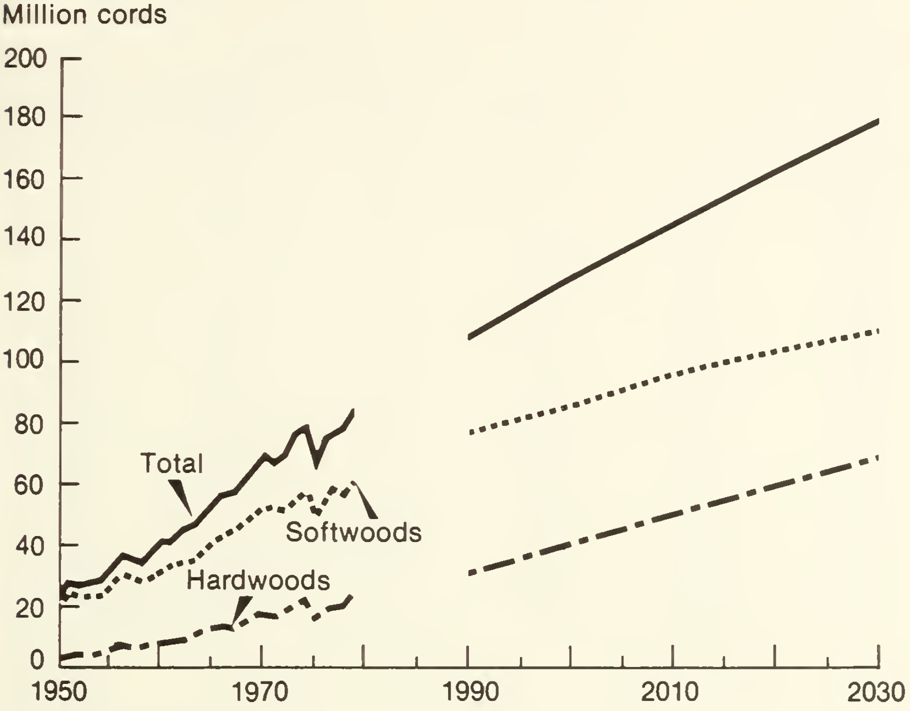
It has been assumed that the net effect of technological developments in the future, together with further increases in use of hardwoods, will cause a decline in consumption of pulpwood per ton of pulp produced to an average of about 1.5 cords in 2000, and to under 1.4 cords by 2030. This would represent an increase of about 13 percent in average yields over the projection period.

[55] Rushton, J. D. and J. P. Howe. Wood utilization by the southern pulp and paper industry. Southern Pulp and Paper Manufacturer 41(6):24–25, 29, 1978. Schroeder, H. A. Chemical pulp from hardwoods native to the South—review of the techniques, properties and markets. Forest Prod. J. 26(1):34–39. 1976.

[56] Evans, J. C. W. Exclusive worldwide TMP survey. Pulp and Paper 52(8):99–110. 1978.

Figure 3.13

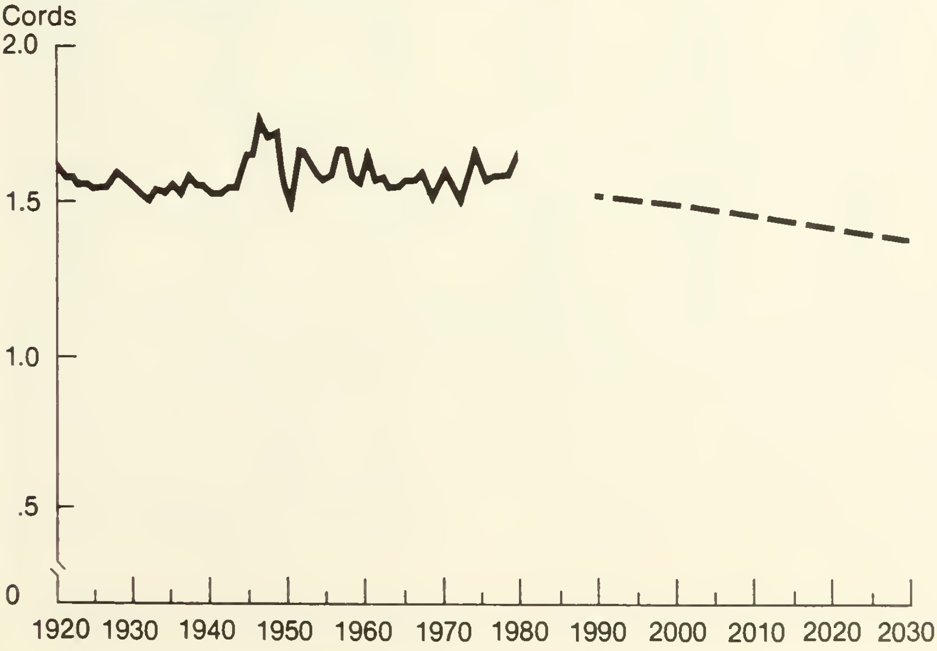
Pulpwood Consumption in U.S. Mills, 1950-79, with Projections* to 2030



*Base level price trends

Figure 3.14

Pulpwood Used Per Ton of Woodpulp Produced, 1920-79, with Projections to 2030



Multiplying assumed wood requirements per ton of pulp by projected domestic production of wood pulp indicates a potential demand for pulpwood in U.S. mills (medium projection—base level price trends) of about 128 million cords by 2000 and 178 million cords by 2030 (table 3.35, fig. 3.13).

Exports of pulpwood.—Prior to the mid-1960's, pulpwood exports from the United States were below 0.5 million cords and were of little significance (table 3.35). Beginning in 1965, however, exports rose rapidly, reaching a level of 3.8 million cords in 1979. The bulk of these increased exports went to Japan and was composed of chips produced from residues at primary timber processing plants on the Pacific Coast. Small but growing volumes of chips have also been shipped to Scandinavia from the South since 1975;[57] in addition, limited amounts of round pulpwood are regularly exported to Canada.

As indicated in Chapter 4, the rapid growth in chip exports to Japan in the 1960's and early 1970's was based on a unique set of circumstances not likely to be maintained in the future. Although Japanese demands for pulpwood are expected to continue to rise, growing availability from other sources such as Siberia, tropical plantations, and domestic forests, coupled with prospective declines in Pacific Coast harvests and projected U.S. pulp and particleboard industry growth, point to the likelihood of future changes in the trend in round pulpwood and chip exports. These factors are expected to become most critical in the decades after 1990, consequently pulpwood exports are projected to grow until that time and subsequently decline to about 2.3 million cords in 2030.

Imports of pulpwood.—Imports of pulpwood for consumption in U.S. mills, nearly all from Canada, have fluctuated between 1 and 2 million cords a year for several decades (table 3.35). Because of Canadian constraints on shipments of unmanufactured wood, and the relatively high transportation costs of shipping pulpwood, no growth is anticipated in these imports.

Demand for domestic pulpwood.—Domestic production of pulpwood in the United States rose from about 5

[57] Haas, Leonard E. Southern chips for Europe. Pulp and Paper 51(6):68–71. 1977.

Table 3.35—*Pulpwood consumption, exports, imports, and production in the*

(Million cords)

Year	Total consumption and exports	Consumption		Exports			
		Total[1]	In U.S. mills	Total[1]	Pulpwood	Woodpulp[2]	Paper and board[2]
1920	8.6	8.2	6.1	0.5	...	...	0.5
1925	11.0	10.8	6.1	.3	...	0.1	.2
1930	13.6	13.2	7.2	.5	0.1	.1	.3
1935	14.4	13.8	7.6	.6	...	.3	.2
1940	19.7	18.0	13.7	1.6	.1	.9	.6
1945	23.6	22.7	16.8	.9	...	.3	.6
1950	32.7	32.0	22.1	.7	([3])	.2	.4
1955	43.6	41.3	32.7	2.3	.1	1.2	1.0
1960	52.7	49.1	41.2	3.6	.2	2.2	1.2
1965	67.4	62.4	53.5	5.0	.2	2.7	2.2
1970	86.9	75.7	69.6	11.2	2.0	5.7	3.5
1971	85.2	75.7	68.0	9.4	1.5	4.0	3.9
1972	88.8	78.8	70.3	10.0	2.0	4.1	3.9
1973	95.9	85.1	75.7	10.8	2.7	4.3	3.8
1974	100.5	87.2	79.7	13.2	3.1	5.3	4.8
1975	83.0	71.5	67.2	11.5	2.6	4.9	4.0
1976	94.1	82.0	75.3	12.1	3.3	4.4	4.4
1977	97.4	85.1	77.7	12.3	3.4	4.8	4.1
1978	100.3	88.3	78.7	11.9	3.1	4.6	4.2
1979[4]	106.6	92.9	83.5	13.7	3.8	5.3	4.6

Low projections[5]

Year	Domestic demand and exports	Domestic demand		Exports			
		Total[1]	In U.S. mills	Total	Pulpwood	Woodpulp[2]	Paper and board[2]
1990	128.0	113.0	103.5	15.0	4.0	5.6	5.4
2000	142.6	127.0	116.1	15.6	3.3	5.7	6.6
2010	155.6	139.8	127.3	15.8	2.9	6.0	6.9
2020	165.8	149.9	136.3	15.9	2.5	6.4	7.0
2030	172.1	156.0	141.7	16.1	2.3	6.7	7.1
Medium projections[5]							
1990	133.4	118.4	108.9	15.0	4.0	5.6	5.4
2000	154.2	138.6	127.7	15.6	3.3	5.7	6.6
2010	173.6	157.8	145.3	15.8	2.9	6.0	6.9
2020	192.4	176.5	162.9	15.9	2.5	6.4	7.0
2030	208.8	192.7	178.4	16.1	2.3	6.7	7.1
High projections[5]							
1990	139.7	124.7	115.2	15.0	4.0	5.6	5.4
2000	167.8	152.2	141.3	15.6	3.3	5.7	6.6
2010	197.3	181.5	169.0	15.8	2.9	6.0	6.9
2020	230.5	214.6	201.0	15.9	2.5	6.4	7.0
2030	264.4	248.3	234.0	16.1	2.3	6.7	7.1

[1]Includes consumption of pulpwood in U.S. mills and the pulpwood equivalent of the net imports of paper, board, and woodpulp.
[2]Roundwood equivalent.
[3]Less than 50,000 cords.
[4]Preliminary.
[5]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; and the American Pulpwood Association.

Projections: U.S. Department of Agriculture, Forest Service.

United States, specified years 1920–79, with projections (base level price trends) to 2030

(Million cords)

Imports				Production				
					Roundwood			
Total	Pulpwood	Woodpulp[2]	Paper and board[2]	Total	Total	Softwoods	Hardwoods	Plant by-products[2]
3.8	1.2	1.6	1.0	4.9	4.7	4.2	0.5	0.2
6.4	1.5	3.0	2.0	4.6	4.5	4.0	.5	.2
7.9	1.6	3.3	3.0	5.7	5.1	4.5	.7	.6
7.8	1.0	3.6	3.1	6.6	6.3	5.6	.8	.3
7.3	1.4	2.2	3.6	12.4	12.1	10.8	1.3	.2
8.3	1.6	3.2	3.5	15.3	14.9	12.8	2.1	.4
12.0	1.4	4.3	6.3	20.7	19.5	16.7	2.8	1.2
12.6	1.8	3.9	6.8	31.0	28.6	23.4	5.2	2.4
12.7	1.3	4.2	7.2	40.0	33.5	25.4	8.0	6.5
15.1	1.3	5.3	8.5	52.3	40.3	29.2	11.0	12.0
16.4	1.1	6.0	9.2	70.5	50.2	36.7	13.6	20.2
16.8	1.2	6.0	9.6	68.4	46.7	33.4	13.3	21.6
17.5	1.0	6.3	10.2	71.2	46.1	31.8	14.3	25.2
18.7	1.2	6.7	10.8	77.2	48.8	32.8	16.0	28.3
18.6	1.0	7.1	10.6	81.9	54.0	37.0	16.9	27.9
14.0	.8	5.1	8.1	69.0	44.3	31.7	12.6	24.8
16.7	1.1	6.3	9.3	77.4	47.7	33.0	14.7	29.8
17.6	1.3	6.5	9.7	79.8	45.8	31.1	14.7	34.0
20.2	1.7	6.6	12.0	80.1	47.1	30.9	16.2	33.0
20.8	1.4	7.3	12.0	85.9	51.3	34.6	16.7	34.6

Low projections[5]

Imports				Demand for domestic pulpwood				
					Roundwood from U.S. forests			
Total	Pulpwood	Woodpulp[2]	Paper and board[2]	Total	Total	Softwoods	Hardwoods	Plant by-products[2]
21.8	1.3	8.7	11.8	106.2	75.7	50.5	25.2	30.5
24.5	1.3	10.1	13.1	118.1	88.9	57.5	31.4	29.2
26.7	1.3	11.2	14.2	128.9	99.7	62.4	37.3	29.2
28.3	1.3	11.8	15.2	137.5	109.0	66.1	42.9	28.5
29.4	1.3	12.0	16.1	142.7	115.5	68.1	47.4	27.2
Medium projections[5]								
21.8	1.3	8.7	11.8	111.6	79.5	53.1	26.4	32.1
24.5	1.3	10.1	13.1	129.7	98.2	63.7	34.5	31.5
26.7	1.3	11.2	14.2	146.9	113.7	71.0	42.7	33.2
28.3	1.3	11.8	15.2	164.1	130.1	78.8	51.3	34.0
29.4	1.3	12.0	16.1	179.4	145.3	85.5	59.8	34.1
High projections[5]								
21.8	1.3	8.7	11.8	117.9	84.0	56.0	28.0	33.9
24.5	1.3	10.1	13.1	143.3	108.5	70.3	38.2	34.8
26.7	1.3	11.2	14.2	170.6	132.0	82.4	49.6	38.6
28.3	1.3	11.8	15.2	202.2	160.3	97.0	63.3	41.9
29.4	1.3	12.0	16.1	235.0	190.3	111.9	78.4	44.7

million cords in 1920 to 85.9 million cords in 1979 (table 3.35, fig. 3.15). Meeting projected increases in pulpwood demand at U.S. mills after allowing for exports and imports of pulpwood would require an increase in U.S. pulpwood production to 130 million cords by 2000 (medium projection—base level price trends) and to 179 million cords by 2030. Rates of growth in pulpwood demand decline rather rapidly—from an average of about 4.1 percent per year in the 1960-1979 period to 1.5 percent annually in the 1990's and to 0.9 percent in the 2020's.

Pulpwood from plant byproducts.—Part of the pulpwood consumed in U.S. mills and of that exported has come from slabs, edgings, veneer cores, sawdust, and other material produced at primary processing plants. Use of these materials increased from 1.2 million cords in 1950 to 34.6 million cords in 1979 (table 3.35, fig. 3.15).

As indicated in Chapter 10, some 96 percent of the cubic volume of wood going into primary processing plants is used for some purpose. This is probably a practical maximum since

some of the residues of primary manufacturing plants are so scattered geographically and in such small volumes that they cannot be economically utilized. Thus, in estimating future demand for round pulpwood, it was assumed that changes in the volume of byproducts use in pulping would largely depend on changes in lumber and plywood production. It was also assumed that while greater use of smaller timber will tend to increase the total volume of byproducts, this would be offset by rising use of thinner saws and more precise manufacturing equipment which would reduce byproduct volumes. Further, it was assumed that there would be increased competition for the available supplies of byproducts.

Under these assumptions volumes of plant byproducts used as pulpwood are projected to remain at about current levels and total 34.1 million cords (medium level) in 2030.

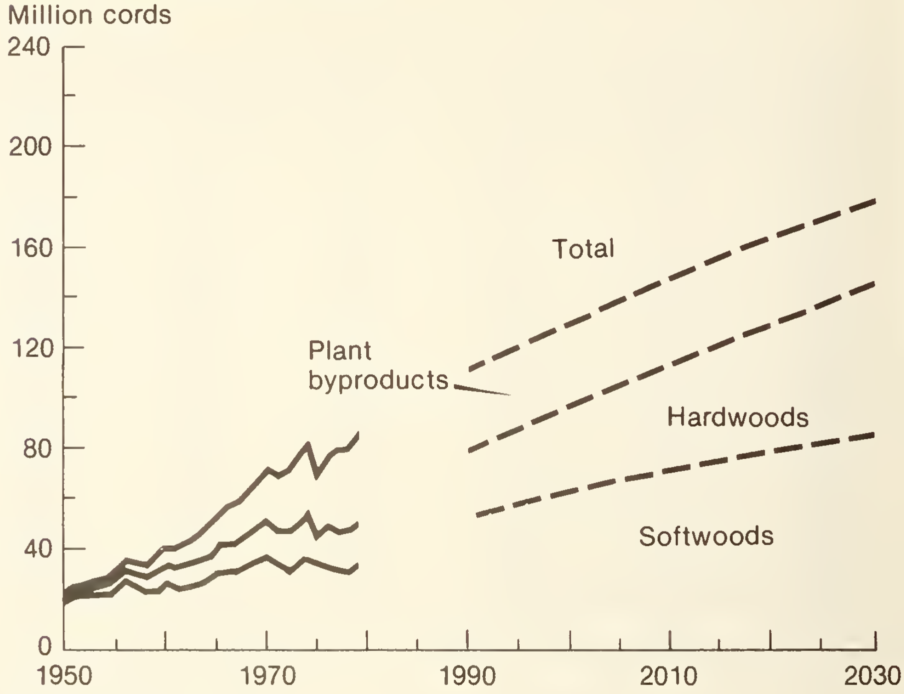
Demand for domestic roundwood.—Domestic roundwood production has increased fairly rapidly since World War II rising from 20 million cords in 1950 to a maximum 54.0 million cords in 1974, when byproduct availability was down because of declines in solid wood products production. In 1975 roundwood production dropped sharply; however, since then output has been higher, reaching 51.3 million cords in 1979.

About two-thirds of total roundwood production was softwood species in 1979. As discussed above, a combination of technological, cost, and supply factors have caused an increase in the proportion of hardwoods consumed in domestic mills over the past several decades. Because the volumes of timber products produced from softwood species far outweigh those produced from hardwoods, most of the plant byproducts available and used are softwoods. Consequently, the proportion of softwood roundwood cut for pulpwood is somewhat smaller than the proportion of softwoods (roundwood and byproducts) used in domestic mills.

Projected demands for domestic roundwood for pulpwood were derived by subtracting prospective supplies of plant byproducts from total projected demands for domestic pulpwood. The medium projection, with base level price trends, rises from 51.3 million cords in 1979 to 98 million cords in 2000, and to 145 million cords by 2030. The volume produced from softwoods is projected to rise from 34.6 million cords in 1979 to 85.5 million cords in 2030; however, the proportion of total production composed of softwood species drops from 67 percent to 59 percent over the projection period.

Figure 3.15

Pulpwood Production, by Source of Material, 1950-79, with Projections* to 2030



*Base level price trends

Although pulpwood generally is obtained from smaller sizes and lower grades of timber, substantial volumes of sawtimber suitable for lumber and plywood also are consumed in the production of pulp and, subsequently, paper and board. In 1976, for example, an estimated 7.3 billion board feet of softwood sawtimber, and 2.6 billion board feet of hardwood sawtimber, were harvested as pulpwood. For softwoods, this was about 45 percent of total round softwood pulpwood output, a proportion showing little change since 1952. Hardwood sawtimber, on the other hand, increased from an estimated 27 percent of total round hardwood pulpwood production in 1952 to about 37 percent in 1976. In many cases, the sawtimber material used for pulp was of relatively low grade. In other cases where sawtimber trees are scattered or where pulpwood is harvested from small tracts by small producers, considerable volumes of sawtimber of relatively high quality have been used.

Factors such as rising timber values and local shortages of wood have been encouraging greater use of small trees and material formerly left as logging residues. Developments in methods of barkchip separation, and/or increased acceptance of bark in the furnishes of some grades of paper and board, will likely lead to greater use of small stems, limbs, and cull trees that were previously left in the forest. Therefore, it has been assumed that the proportion of round softwood pulpwood supplied from sawtimber will show little change. For hardwoods, however, because of the relatively more favorable supply outlook for lower quality material, a small increase is expected. As a consequence, total sawtimber used for pulpwood is projected to rise to about 30 billion board feet by 2030, triple consumption in 1976.

Demand for pulpwood including the roundwood equivalent of net imports of paper, board, and wood pulp.—In addition to pulpwood from U.S. forests, a substantial volume of wood is represented by imports of pulp, paper, and board. In 1979, for example, the roundwood equivalent of such net imports (imports minus exports) was 9.4 million cords (table 3.35). With this

In addition to sawlogs, veneer logs, and pulpwood, discussed above, there is a variety of other industrial products, such as poles, posts, piling, and mine timbers produced and consumed.

added to domestic production, the total volume of pulpwood required to manufacture the paper, board, and woodpulp consumed in the United States in 1979 was 92.9 million cords.

Exports of pulpwood and pulpwood products (pulp, paper, and board) in 1979 were equivalent to 13.7 million cords. Thus, total domestic and export demand for pulpwood in 1979 amounted to 106.6 million cords.

Projected demands for pulpwood for U.S. consumption, including the roundwood equivalent of net imports of wood pulp and paper and board, rise from 92.9 million cords in 1979 to 192.7 million cords by 2030 (medium projection—base level price trends).

Total pulpwood demands for both U.S. consumption and exports are projected to increase to 209 million cords by 2030.

Demand for pulpwood under alternative assumptions.—The alternative population and gross national product assumptions of this study have a sizeable impact on demands for pulpwood with base level price trends (table 3.35). For example, in 2030 projected demands for pulpwood for U.S. consumption vary between 172 million and 264 million cords.

If timber supplies are not adequate in future years to meet the projected increases in demands for both pulpwood and other timber products, as indicated by the data in Chapter 8, there will be upward pressure on paper and board prices. Also, other fibers —waste paper, bark, limbs and tops, tropical hardwoods, kenaf, and plastics —will be used to a greater extent. The implications of such changes are discussed in Chapter 10.

Demand for Miscellaneous Industrial Timber Products

As shown in the following tabulation, a variety of miscellaneous industrial roundwood products is consumed in the United States.

Total consumption of these products amounted to 379 million cubic feet in 1976. This was somewhat below the general level of the 1950's and 1960's, when estimated consumption averaged 500-700 million cubic feet per year, and far below consumption of more than 2 billion cubic feet annually in the early 1900's. International trade in these products is small and consumption has been roughly equal to production.

The downward trend in consumption of miscellaneous industrial roundwood products which began around 1910 appears to have bottomed out in recent years. For this analysis, it was assumed that demand for these products will rise slowly to 900 million cubic feet by 2010 and remain at that level through 2030. Individual products are likely to show divergent trends as indicated below.

Cooperage Logs and Bolts. In the early 1900's, roundwood used in manufacture of barrels, kegs, pails, and tubs made of wood staves totaled about 1.8 billion board feet annually—about 40 percent in tight cooperage and 60 percent in slack cooperage. Since then, new technology, changes in consumer buying habits, and new packaging techniques have sharply reduced demands for cooperage.

By 1976, consumption had dropped to about 94 million board feet. Most of this was for tight cooperage. Over half of the tight cooperage was used in bourbon barrels, with the remainder used for chemical and other containers. The slack cooperage was mainly used

Product	*Standard unit of measure*	*1952*	*1962*	*1970*	*1976*
Cooperage	Million board feet	355.3	216.0	214.7	93.9
Piling	Million linear feet	41.2	41.5	28.8	39.4
Poles	Million pieces	6.5	6.7	5.4	6.3
Posts	Million pieces	306.0	168.7	97.7	59.9
Mine timbers	Million cubic feet	81.0	48.4	32.1	23.6
Other[58]	Million cubic feet	235.2	157.6	198.8	178.9
Total	Million cubic feet	698.8	465.4	424.0	378.8

[58]Includes charcoal wood, roundwood used in the manufacture of particleboard; poles and rails used in fencing; bolts used for products such as shingles, wood turnings, and handles, and other miscellaneous items such as hop poles and the wood used for the production of chemicals.

for barrels for food and hardware. Future demands for cooperage logs and bolts are expected to remain close to the level of the mid-1970's at about 100 million board feet.

Poles and Piling. Use of wood poles in the construction and maintenance of utility lines and other structures has been relatively stable in recent years. In the period 1970-76, for example, volume of poles treated with preservatives totaled 70 to 75 million cubic feet annually, or slightly less than in the previous decade. Although there is a trend away from use of poles in new residential areas, anticipated expansion of demands for electric and communication facilities, growing needs for pole replacements, and the expanding use of poles in construction are expected to result in demand for about the same volume of poles over the projection period.

Treated wood piling used in construction of docks, bridges, and buildings averaged about 14 million cubic feet a year in the period 1970-76. In addition, an estimated 13 million cubic feet of untreated piling was used annually in this period. In view of projected increases in construction, a modest increase in demand is considered likely.

Fence Posts. Use of round and split wood posts for farm fencing and other purposes such as highway barricades and yard enclosures dropped from an estimated 900 million posts in 1920 to approximately 98 million (68 million cubic feet) in 1970 and about 60 million in 1976 (44 million cubic feet). This decline was a result of several factors, including substitution of steel posts, increased use of preservative-treated wood posts, and changes in farm size and farming methods that involve less use of fencing. These forces are expected to result in further reduction in demands in future decades.

Other Industrial Timber Products. Use of round, split, and hewn mine timbers fell from an estimated 174 million cubic feet in 1920 to 32 million cubic feet in 1970, and 24 million cubic feet in 1976. Projected increases in production from underground mines as a result of prospective coal production, however, suggest that this trend may be reversed.

Consumption of wood for a wide variety of products such as particleboard, charcoal, and wood distillation products, shingles, excelsior, hewn ties, turnery products, and miscellaneous farm timbers amounted to about 180 million cubic feet of roundwood. Wood consumption for some of these products, especially particleboard, has been rising, but there have been offsetting declines in other uses. It has been assumed that future use will grow relatively rapidly. Much of the increase is expected to come from expanding use of roundwood for structural grades of particleboard. There also may be a significant increase in use for chemicals including the production of methanol for fuel. However, at this time, with the existing technology and the current costs of petroleum and chemicals produced from other materials, the economic potential is quite limited.

In addition to the roundwood, some 516 million cubic feet of plant byproducts such as sawdust, slabs, and edgings were used in the production of charcoal, chemicals, and various other goods in 1976. Because of the competition from other uses and limitations on supply, little change is expected in the future.

Demand for Silvichemicals

The above discussion has been concerned with solid and fiber wood products. There is another group of products, silvichemicals, which have impacts on the demand for timber and on the management and use of the commercial timberland base. Silvichemicals include such products as naval stores, lignin products, ethyl alcohol, vanillin, torula yeast, acetic acid, dimethyl sulfide and dimethyl sulfoxide, activated carbon, feed molasses, animal fodder, and a variety of small-volume essential oils, gums and botanicals.[59] In 1977 an estimated 3.3 billion pounds of silvichemicals valued at over $400 million were produced (table 3.36).

Naval Stores. Of the silvichemicals produced, naval stores have the largest aggregate volume and value. Naval stores are primarily produced from the pines of the southeastern United States and are of three types: gum, wood, and sulfate. Gum naval stores are produced by wounding pine trees (chiefly slash and longleaf) and collecting the oleoresin (pine gum) which is then processed into rosin and turpentine. Wood naval stores are produced from the heartwood of old-growth pine stumps. These stumps, which have 20 to 25 percent extractives, are shipped to central plants where they are shredded and processed using petroleum solvents to extract turpentine, a pine oil, and rosin. Sulfate naval stores are derived as byproducts from the sulfate pulping process. Turpentine is obtained from the relief gases during pulping and a material known as tall oil is recovered from the spent cooking liquors. Most

[59] A more detailed discussion of silvichemicals is contained in an article by Bratt, Lars C. Wood-derived chemicals: Trends in production in the U.S. Pulp and Paper 53(6):102–108. June 1979.

Table 3.36—*Volume and value of silvichemicals produced in the United States, 1977*

Product	Production	Value
	Million pounds	*Million dollars*
Naval stores (all sources)[1]		
Rosin	707	140.0
Fatty acids	359	90.0
Tall oil heads and pitch	400	20.0
Refined tall oil heads and pitch	105	19.4
Turpentine	173	21.5
Byproducts[2] from spent pulping liquors		
Lignin products	1,200	57.0
Ethyl alcohol	33	5.0
Torula yeast	16	6.4
Vanillin	6	30.0
Dimethyl sulfide and dimethyl sulfoxide	9	3.5
Acetic acid	8	1.6
Miscellaneous products		
Activated carbon	50	12.5
Feed molasses	140	5.3
Animal fodder[3]	63	1.6

[1]Data except fatty acids for crop year ending March 31, 1977.
[2]Excludes sulfate naval stores.
[3]Data are for 1979. There was little or no production in 1977.

Sources: Naval stores except fatty acids, U.S. Department of Agriculture, Statistical Reporting Service, Crop Reporting Board, Washington, D.C., May, 1977; Fatty Acids, Pulp Chemicals Association. New York. 1979; Ethyl alcohol, torula yeast, acetic acid, and activated carbon, Bratt, L. C., *Wood-derived chemicals: Trends in production in U.S.* Pulp and Paper, 53(6):102–108. June, 1979.

of the tall oil is further processed by distillation to yield rosin and tall oil fatty acids as primary products.

Historically, gum and wood were the primary sources of naval stores. However, the relative importance of sources has changed and now sulfate pulping is the major source.[60]

Rosin.—Domestic production of rosin in the 1977 crop year totaled about 707 million pounds (1.3 million drums), some 30 percent lower than the 1.1 million pounds (2 million drums) annual production level of the 1950's and early 1960's. Sixty percent of the rosin now is from tall oil (sulfate), 36 percent is from stumps (wood), and 4 percent is gum rosin.

Gum, wood, and tall oil rosins are essentially interchangeable for many uses but are not for others (e.g., the sulfur impurities in tall oil rosin inactivate certain catalysts). Rosins are usually used in a chemically modified form. The largest single use for rosin is for sizing paper to control water absorptivity. This market, however, has been declining due to synthetic substitutes and to greater efficiency in use of rosin size formulations. At one time, rosin was used extensively in the old yellow bar laundry soaps (38 percent of the rosin was used for this purpose in 1938), but this use is almost negligible now. Rosin soaps, however, have a major market as emulsifying and tackifying agents in synthetic rubber manufacture. Other major uses for rosin are in synthetic resins and adhesives. Rosin esters are also used in chewing gums. Rosin also has small specialty markets such as rosin bags for sports use.

Fatty acids.—About 359 million pounds of fatty acids were produced in 1977. This represented nearly one-third of the total United States production of fatty acids from all sources (over 1 billion pounds annually) and half of the unsaturated fatty acids.

Tall oil fatty acids are now prized for their special qualities in contrast to their early use simply as cheap substitutes for fatty acids from other sources. Currently, for example, about one-half of the tall oil fatty acid production is used for intermediate chemicals such as epoxy tallates and dimer acids that are in turn used in polyamide resins for inks, adhesives, and coatings. About one-fourth is used in paints, varnishes, and other protective coatings. The remainder is used in soaps and detergents, hard floor coverings, and other products.

Tall oil heads, pitch, and refined tall oil.—In addition to the rosin and fatty acid fractions, distillation of tall oil produces a relatively volatile "heads" fraction, a still-bottom "pitch" fracton, and a refined or distilled tall oil. Because of its chemical and physical characteristics, the pitch fraction has found little use other than as boiler fuel. However, much of the heads material is now being used, primarily as low cost (about 11 cents per pound) chemicals for ore flotation, particularly in the phosphate industry.

By definition, tall oil fatty acids contain less than 10 percent rosin, and tall oil rosin contains less than 10 percent fatty acids. Intermediate distillation material not meeting this definition is designated distilled tall oil. The refined tall oil category shown in table 3.36 consists almost entirely of distilled tall oil with acid-refined tall oil making only a small contribution. Most uses of refined tall oil are similar to those of tall oil fatty acids and rosin and depend on the specific composition of the refined tall oil material.

Turpentine.—Total domestic turpentine production was 173 million pounds in 1977. Annual production of turpentine has decreased sharply since the early 1960's, when production exceeded 270 million pounds. The pattern of turpentine sources is somewhat different than for rosin in that over 85 percent of the turpentine is from sulfate pulping, 12 percent is from stumps, and only 3 percent is from gum oleoresin.

The major market for turpentine was as a solvent in paints, but in the past decade turpentine has been increasingly used as a chemical raw material. The primary use of turpentine now is in the conversion of its pinene constituents into synthetic pine oils with different properties. These pine oils are used in mineral flotation, in processing textiles, as solvents, as odorants, and as bactericides. Over 80 percent of the pine oil produced is synthetic; the remainder is the so-called natural pine oil that is obtained on fractionation of stumpwood extractives.

The second largest and growing use of turpentine is for polyterpene resins. The main use for these terpene resins is in adhesives, particularly in the compounding of pressure-sensitive adhesives such as for transparent tapes. About 15 percent of the turpentine is used to prepare chlorinated-toxaphene-type insecticides. The future of these chlorinated insecticides, however, is uncertain.

One of the most interesting uses of turpentine is in the production of flavor and fragrance chemicals, some of which command market prices of $15 to $20 per pound. Synthesized products such as lemon, lime, peppermint, spearmint, and nutmeg essential oils are being marketed along with a wide range of fine chemicals for the flavor and fragrance (e.g., lilac, violet, lily of the valley, rose, lemon) industry and for the synthesis of vitamins A and E. Turpentine is an important raw material in the synthesis of e-menthol for use in cigarettes, cosmetics, drugs, and confectionary products.

Byproducts from Spent Pulping Liquors. A variety of silvichemicals is being produced as pulping byproducts in addition to tall oil and sulfate turpentine. Annual output among the products varies from 6 million pounds (vanillin) to 1,200 million pounds (lignin products) with values ranging from 5¢ to $5 per pound.

Lignin products.—Lignins, the natural polyphenolic glues that hold the cellulose fibers together, constitute about 25 percent of wood.

The output of lignin products in 1977 was 1.2 billion pounds. Only a small proportion of the lignin available in spent pulping liquor, however, is recovered for production of lignin chemicals. Nearly all of these are sulfonated derivatives. Of the total production of lignin sulfonates, about 95 percent are obtained directly from sulfite pulping and 5 percent by sulfonation of sulfate lignin. Although specialty lignin products have been developed,

Historically, naval stores came primarily from pine gum collected from wounds on pine trees, chiefly the slash and longleaf pines. Now most naval stores are obtained as byproducts from sulfate pulping.

[60] Campbell, D. E. Byproducts from kraft mills increase dominance of naval stores market. Pulp and Paper 51(14):138–139. 1977.

the bulk of lignin products presently produced is used as drilling mud thinners in oil wells; in adhesives, dispersants, leather tanning agents; and for water treatment. Tertiary recovery of crude oil from spent wells may offer a large market for lignin products. ,

Ethyl alcohol.—Since the 1940's, one sulfite pulp mill has produced industrial grade ethyl alcohol by fermentation of the sugars in the spent liquors. This was marketed in competition with petrochemical-derived alcohol. However, it is now blended with gasoline to make gasohol commanding a premium price of $1.50 per gallon. This plant produces about 11 thousand gallons per day, the quantity being limited by the availability of liquor.

Throughout the United States, sugars are available in spent sulfite liquors for a potential tenfold increase in current alcohol production. Nearly all of these spent liquors are currently burned, primarily to recover the pulping chemicals, but also to recover simultaneously the energy content of the organic materials which includes the sugars. Because of the overall economics and the energy balance at the pulp mill, increased production of alcohol from spent sulfite pulping liquors is not anticipated.

Torula yeast.—Two sulfite pulp mills grow food grade torula yeast on the sugars in spent sulfite liquors. One plant started production in the 1940's and the other in the 1970's. Production in 1977 was about 16 million pounds.

A major use of the yeast is for fortifying processed food products such as breakfast cereals with vitamins and with protein (which balances the amino acid content of the total protein of the product to conform with human nutritional requirements). Although the spent pulping liquors not used currently for producing ethyl alcohol or yeast could support a fivefold increase, yeast production is expected to show little change in the next several years.

Vanillin.—Vanillin is obtained by alkaline oxidation of the lignosulfonates in spent sulfite liquor. Production of vanillin in 1977 was about 6 million pounds. The market for vanillin as vanilla flavor has expanded tremendously in the past few years as a result of a shortage of vanilla beans. It is also used in a variety of other flavors and fragrances and as a pharmaceutical raw material.

Dimethyl sulfide and dimethyl sulfoxide.—Treatment of kraft black liquor with sulfur at elevated temperature and pressure yields dimethyl sulfide, a major portion of which is then oxidized to dimethyl sulfoxide.

Dimethyl sulfoxide is used as an industrial solvent and has recently received long-awaited approval for drug use. It readily diffuses through skin carrying other medicants into the body. The large available supply of kraft black liquor offers a resource which would support a large increase in production of these sulfur chemicals, but dimethyl sulfide is readily and competitively produced from methanol and hydrogen sulfide.

Acetic acid.—Wood-derived acetic acid, produced only at one plant, is obtained by extraction of acidified spent sulfite pulping liquor from the neutral sulfite semichemical pulping process. Although technically feasible, co-recovery of formic acid is not economical at present.

Miscellaneous Products. In addition to the products described above, there are a large number of other silvichemical products derived from wood. The most important of these, as measured by the volume of production, are activated carbon, feed molasses, and animal fodder.

Activated carbon.—Seven companies, with a current capacity of 290 million pounds per year, produced about 200 million pounds of activated carbon in 1977. Of this, only about 50 million pounds comes from wood; the remainder was produced from petroleum, lignite, and coal.

Over one-half of the activated carbon is used as a decolorizing agent in sugar refineries, and about one-third is used in water and waste water treatment to remove chlorinated organic compounds produced during chlorination. New regulations limiting the amount of chlorinated organic compounds in water are expected to greatly increase the demand for activated carbon. Any other increased demand for activated carbon would be directly related to an increase in sugar production.

Feed molasses from wood.—Three plants now manufacture a molasses for livestock feed as a byproduct from wet process hardboard manufacture. Production of this byproduct, a hemicellulose extract, is estimated at 140 million pounds in 1977. It is sold both as a molasses at 60-65 percent solids and as a spray dried product. Other markets for wood molasses include its use as an admix to products such as fertilizers where the control of dust is desired.

A similar product can be produced from the pulpmill prehydrolyzate, but at this time the concentrated prehydrolyzate is being burned for fuel. There are also 13 wet hardboard plants with the potential for producing a similar molasses product, but these currently dispose of the material in ordinary effluent treatment systems.

Animal fodder.—Six hydrolysis plants are operating to produce an animal fodder from wood. Five use a batch acid hydrolysis process and the other a continuous steam hydrolysis process. Production in 1979 is estimated at 63 million pounds.

Production could show a substantial increase in the near future. Recent approval by the Food and Drug Administration of the use of aspen in animal rations could cause an expansion of the market for animal fodder made from aspen residue, especially the bark, leaves and twigs. The plant capacity for producing animal fodder will also expand after the construction of two planned wood fuel pellet mills in northern Wisconsin and Minnesota because the same equipment, and sometimes the same product, can be used for either fuel pellets or animal fodder.

Essential oils, gums, and botanicals.—Essential oil production from wood and other tree components usually consists of rather dispersed small operations. Cedarwood oil from eastern red cedar is a secondary product obtained by steam distillation of waste shavings and sawdust, whereas Texas cedarwood oil is the primary product of the Texas cedar which is specifically harvested for oil production. Production estimates for these oils are not available.

Consumption of cedarleaf oil (from *Thuja occidentalis* rather than *Juniperus* species that are the source of wood oil) for pharmaceutical and fragrance uses has been reported to be near 50 thousand pounds per year. Much of the cedarleaf oil is produced in the United States and the remainder in Canada.

Extraction of western larch wood chips with hot water yields the carbohydrate gum, arabinogalactan. The product has found only limited use, however, primarily as a printing ink additive.

A variety of other oleoresins (e.g., spruce "gum," fir balsam), true balsams (e.g., storax), carbohydrate gums, and botanicals are produced in small quantities for specialized pharmaceutical, laboratory and other uses.

The Outlook for Silvichemicals. Although no quantitative analysis has been

made, the anticipated growth in population, economic activity, and income suggest that the demands for most silvichemicals are likely to grow in the years ahead. The existing potential for increasing supplies of many silvichemicals, as described above, and as indicated by the projected increases in the output of most timber products, is large.

In terms of volume and economic importance, the potential for increased supplies of naval stores is particularly significant. Naval stores, as a renewable raw material, can provide a limited but substantial contribution to the replacement of nonrenewable petrochemicals. The production of tall oil and its derivatives, and of sulfate turpentine, is highly correlated with sulfate pulp production. The projections presented above indicate that there are likely to be large increases in the production of this kind of pulp, although the output of tall oil and turpentine may be constrained by the increasing use of wood chips (which generally provide lower yields of naval stores than does roundwood) and hardwoods.

Future supplies of naval stores could also be affected by the chemical treatment of pine trees to induce the accumulation of oleoresin in the tree trunk. Recent research shows that there is a potential to increase tall oil and sulfate turpentine production several times by such treatment.[61] The widespread use of this technology could supply new and large volume markets.

There are other developments which could lead to a large expansion in the production of certain silvichemicals.[62] For example, the demand for hylitol, a sweetener derived from birchwood, could grow rapidly if it proves to be safe to use in reducing diets and products such as candy and chewing gum. Improvements in the technology of producing ethyl alcohol and/or fuel oil from wood could result in large increases in the production of these products and in the demand for wood.

Demand for Fuelwood

Fuelwood consumption in 1976 was an estimated 18 million cords or 1.4 billion cubic feet. This included approximately 330 million cubic feet of roundwood from growing stock trees; and 270 million cubic feet from other roundwood sources such as rough and rotten trees, fence rows, and from forests not classified as commercial timberland; and 752 million cubic feet of primary plant byproducts. The total volume of wood used for fuel was equivalent to about 21 million tons of dry wood. Additionally, some 10 million tons (dry basis) of bark was consumed for fuel in 1976.

As a result of large increases in the prices of oil, gas, and coal, the use of wood for domestic heating rose rapidly in the late 1970's.

Uses of Fuelwood. Fuelwood cut from roundwood was used mostly for domestic heating and cooking. Plant byproducts were used both for domestic purposes and for industrial fuel, primarily at wood processing plants.

Residential use of fuelwood.—Round fuelwood was the major source of energy in the United States until the 1880's. Fuelwood use dropped sharply in the first half of the present century, replaced by fossil fuels and electricity. Difficulties in fossil fuel supply during World War I, The Great Depression, and World War II brought renewed interest in wood, but these episodes did not significantly change the rapid decline in fuelwood consumption. By 1970, less than 2 percent of all households in the United States used wood as their primary fuel for heating and less than 1 percent as their primary cooking fuel.

With the unprecedented rise in fossil fuel costs which has occurred since 1974, an increasing number of households (estimated at 912,000 in 1976) is using wood as a primary source of heating.[63] A much greater number is using wood for supplementary heat or for esthetic purposes. In 1979, 62 percent of the new single-family homes built had one or more fireplaces, as compared to 35 perecent in 1970.[64] Scattered data indicate that the number of wood stoves has also risen substantially. Thus, it is assumed that residential use of wood fuels, especially from roundwood, will increase steadily from 6 million cords in 1976 to approximately 26 million cords in 2030. However, it is possible that demands will rise much beyond this projected level. It is also conceivable that major alternative sources of oil, such as tar sands and oil shale, and natural gas from geopressurized hot fluids, may become suf-

[61] Stone, Robert N. A critique of completed research on paraquat-induced lightwood. Paper given at the Forest Biology Wood Chemistry Conference, held June 1977, Madison, Wisconsin, and published in TAPPI Conference papers, p. 57–63. 1977. Stone, Robert N., ed. Annual proceedings, Lightwood Research Coordinating Council Meeting at Jacksonville, Florida, in cooperation with Southeast Forest Experimentation Station, and U.S. Forest Products Laboratory, January 22–23, 1975. 145 p. March 1975.

[62] Bratt, Lars C. *Op. cit.*

[63] U.S. Department of Commerce, Bureau of Census. Residential energy uses. Series H-123-77. 8 p. May 1978.

[64] U.S. Department of Commerce, Bureau of the Census. Characteristics of new housing: 1979. Constr. Reps. C25-79-13, 1980. U.S. Department of Commerce, Bureau of the Census. Characteristics of new one-family homes. 1970. Constr. Reps. C25-70-13, 1971.

ficiently developed before then to reverse this trend.

Industrial and commercial uses of fuelwood.—Of the 752 million cubic feet (about 11 million tons, dry basis) of wood byproducts used as fuel in 1976, about 90 percent went to produce steam heat and electricity at wood processing plants. Additionally, pulpmills used about 5 million tons, dry basis, of bark removed from roundwood pulpwood and 61 million tons of spent liquor solids for fuel.[65] Wood processing plants in the future are likely to use as fuel nearly all their bark and most of their wood byproducts not sold for wood pulp or particleboard furnish.[66] As fossil fuel costs continue up, some plants will also bring in nearby forest residues, or urban residues, to supplement mill-generated fuels.

Currently, a small amount of mill wood byproducts and bark is used for producing heat or steam power at other manufacturing plants or institutional-commercial buildings outside the wood processing industries. There is much interest in the possibility of increasing the use of wood for such purposes—especially as an outlet for forest residues and wood from cull trees, thinnings, and dead trees.[67] It is too early to estimate with any confidence the eventual extent of such use.

In 1978, wood and bark provided all or part of the fuel requirements of some 10 or 12 utility plants in the United States.[68] In at least one case, excess power produced at a pulpmill was used as part of a municipal electricity supply. More such arrangements are expected.[69] Plans for several new wood-using steam-electric plants have been announced. For example, by 1978, Vermont's Burlington Electric had converted one coal furnace to accept wood chips. The company converted another in 1979 and plans to construct a new 50 megawatt plant by 1983. Nearly all wood used in steam-electric facilities in the past has been mill byproducts, but harvesting of timber specifically for fuel is envisioned in some current plans.[70] With increasing use of sawmill and veneer mill byproducts for pulp and particleboard furnish, or for fuels by wood-processing plants themselves, there probably will be few locations in the United States where sufficiently large concentrations of mill residues will be available for utility operation. A recent study indicated that a 50 megawatt steam-electric plant would require 240,000 dry tons of wood annually.[71]

The ultimate magnitude of fuelwood use by steam-electric plants will depend on many factors, such as price trends for coal and oil in comparison to fuelwood, practical aspects of developing assured long-term fuelwood supplies, problems in collecting and storing very large quantities of wood or bark, and the problems involved in meeting emission control standards.[72] The National Energy Act of 1978 provides for incentives toward cogeneration and use of fuels other than oil and gas in steam-electric fatcilities.[73] Because fuelwood requirements of even small steam electric plants would be very large, the potential impact of a single such installation on local timber supply could be great. With extensive development, there would be major impacts on timber resources, and especially hardwood resources, over large areas. However, again, it is too early to make reliable projections of timber demand for steam-electric utilities.

Plantations.—With practices similar to those used in modern agriculture, intensively cultivated plantations of fast-growing trees can produce as much as 10 tons per acre (dry basis) per year of wood, bark, and foliage. The possibility of establishing such plantations on a scale large enough to provide a steady source of fuel for steam-electric utilities, or raw material for chemical conversion to liquid fuels, recently has received much attention from scientists and energy policymakers.[74] Plantations of tens of thousands or hundreds of thousands of acres might be required. Several small-scale (1,000 acre) trials now are planned to provide improved estimates of yields and costs of such plantations. Large-scale development could profoundly affect forestry in the United States; but until more information on practical economics becomes available, it is not possible to make meaningful projections of the effects on timber demands and supplies.

Environmental and economic considerations.—Fuel uses already provide outlets for large quantities of mill byproducts and for some urban wood refuse, thus mitigating large waste-disposal problems. Producing fuel from logging residues, cull trees, and portions of overstocked stands would, in many cases, reduce fire hazards and improve the economic feasibility of intensive silviculture. However, there could be serious environmental and economic problems associated with large-scale developments such as steam-electric utility plants.[75] One potential result could be increasing competition for byproducts currently used in manufacture of wood pulp and particleboard. Another possibility is esthetic and physical deterioration of timber stands. This problem may become an important issue, particularly in areas where timber harvesting has been unobtrusive heretofore or where timber growth has been above timber removals. Therefore, it seems clear that the potential impacts of major fuelwood-consuming installations will have to be evaluated carefully; and, the costs of delivering a sustained, long-term wood supply to expensive installations requiring hundreds of thousands of tons of fuel must be weighed with equal care—case-by-case.

Summary of Demand for Timber

The projections of demand for timber products presented above have been in standard units of measure, that is, board feet of lumber, square feet of plywood, cords of pulpwood and fuelwood, and cubic feet of miscellaneous industrial roundwood products. In order to compare demand for these products

[65] American Paper Institute, Raw Materials and Energy Division, U.S. pulp, paper and paperboard industry: estimated fuel and energy use, 1 p. April 10, 1978.

[66] Jamison, R. L., N. E. Methuen, and R. A. Shade. Energy from biomass. A report of Task Force No. 5 of the Industrial Energy Group; National Association of Manufacturers, Washington, D.C., 15 p. June 29, 1978.

[67] U.S. Department of Energy, Solar energy—a status report. 55 p. June, 1978.

[68] U.S. Department of Energy, Federal Energy Regulatory Commission, Monthly power plant reports (F.E.R.C. Form No. 4) Computer printout dated April 3, 1979.

[69] U.S. Department of Agriculture, Forest Service. Quads. Report No. 7 on energy activities. August, 1979.

[70] See, for example, New England Energy Congress. Final report, sponsored by the New England Congressional Caucus and Tufts University. 454 p. May 1979. (Available from the New England Energy Congress, 14 Whitfield Road, Somerville, Maine 02111.)

[71] Letter from R. L. Jamison, Director of Energy Management, Weyerhaeuser Company, to Richard Bryant, U.S. Department of Agriculture, Forest Service, April 10, 1978.

[72] Ellis, Thomas H. Should wood be a source of commercial power? Forest Prod. J. 25(10):12–16. October 1975.

[73] U.S. Department of Energy, Office of Public Affairs. The National Energy Act. DOE information kit. 47 p. November 1978.

[74] See, for example: Inman, R. E. Silvicultural biomass farms, MITRE Corp., McLean, Virginia. Vol. I summary. 62 p. 1977. Calef, Charles E. Not out of the woods. Environment 18(7):17–25. September 1976.

[75] Decker, H. V. Wood energy, just a word of caution. The Northern Logger 27(9):3. March 1979.

with projections of timber supplies, presented in following chapters, these projections must be converted to common units of measure—cubic feet of roundwood and board feet of sawtimber.

Improvements in Utilization. An important factor in converting demands for timber products to roundwood is prospective change in utilization practices. In recent decades, in response to rising stumpage costs, there have been substantial improvements in utilizing the timber harvested from forests. Such improvements, discussed in detail in Chapter 10, have involved an increasing use of slabs, edgings, sawdust, veneer cores, shavings, and other similar material for pulp and particleboard. Various technological developments such as thinner saws and automatic patching and stitching in veneer mills have led to increased product yield per unit of wood input, although in the lumber industry this apparently has been offset by the use of smaller and lower quality material and the spreading use of low-yield (lumber) equipment such as chipping headrigs. Yields in the pulp industry have been held down by a large rise in the production of bleached and semi-bleached pulps which require more wood per ton of production.

With respect to the future, it has been assumed that there would be significant increases in timber product yields over the projection period. These increases under base level price trend assumptions average about 10 percent for lumber, plywood,[76] and woodpulp. These percentages would, of course, be larger under the equilibrium (higher) price trend assumptions. The opportunities for further improvement are discussed in Chapter 10.

Recent Trends in Roundwood Consumption. In 1976 total U.S. consumption of timber products in terms of roundwood volume was 13.4 billion cubic feet (table 3.37, fig. 3.16; Append. 1, tables 1.26–1.28).[77] Roundwood consumption rose to 14.8 billion cubic feet in 1978 and 1979, a peak in a trend that has increased from around 11 billion cubic feet in the early 1960's. Roundwood consumption in 1978 and 1979 was also materially above the levels attained in the early 1900's, when lumber use was at an all-time high and record volumes of fuelwood were consumed.

Almost half of the roundwood consumed in 1976 consisted of sawlogs and little over a third was pulpwood. An additional 11 percent was used for veneer logs and the remaining 7 percent consisted of other industrial roundwood products and fuelwood.

From the early 1950's to 1976, there was a 7 percent rise in the volume of sawlogs consumed while round pulpwood nearly doubled and veneer logs quadrupled. In contrast, use of roundwood for miscellaneous industrial products and fuelwood declined during the 1950's, 1960's and early 1970's. However, as described above, it was assumed that the decline in consumption of these products has bottomed out and that demands will rise in the future.

Projected Demand for Roundwood. Increases in projected demands for all products combined are substantial over the projection period. For example, the medium projection of demand with base-level prices reaches 22.7 billion cubic feet in 2000, with a continuing rise to 28.3 billion cubic feet in 2030—more than double consumption in 1976. Most of the projected growth in demand is for round pulpwood; consequently, pulpwood accounts for 46 percent of the total demand for roundwood in 2030, compared with a third in 1976.

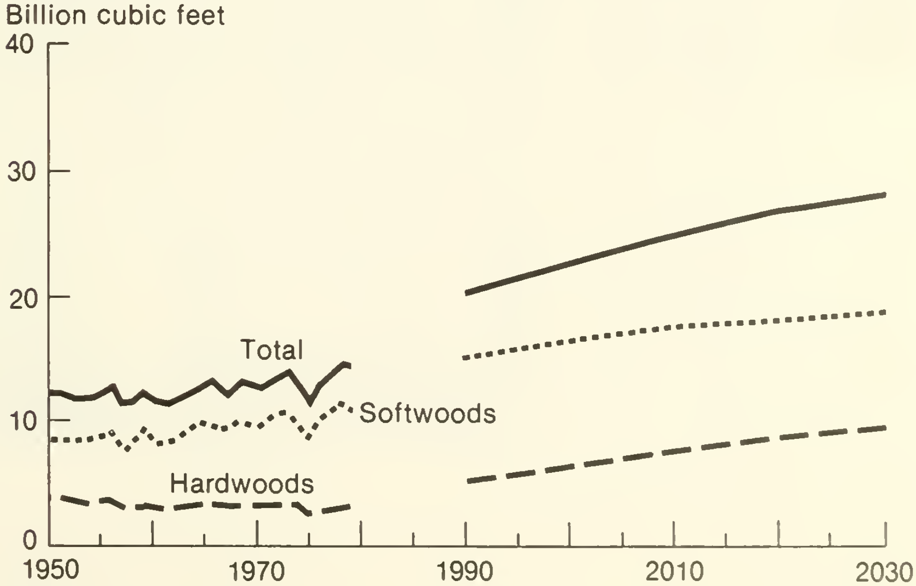
Projected roundwood demands are materially affected by the assumptions on population and economic activity specified in Chapter 2. The range in projected total demand for roundwood in 2030 with base-level price trends, for example, is from 24.0 billion to 34.4 billion cubic feet.

Projected Demand by Species Group. Growth in roundwood consumption in the 1950–72 period consisted entirely of timber produced from softwood species. Consumption of hardwood roundwood fell in response to declines in use of miscellaneous industrial timber products and fuelwood. This trend was reversed in 1972, however, largely in response to increases in furniture and pallet manufacture and rising fuelwood consumption, the bulk of which comes from hardwoods.

Projections show rather large increases for both softwoods and hardwoods. Assuming base-level price trends, the medium projection of demand for softwoods is up four-fifths by 2030 from 10.4 to 18.7 billion cubic feet.

Figure 3.16

Roundwood Consumption, 1950-79, with Projections* to 2030



*Base level price trends

[76] It was assumed that yields of lumber and plywood would increase 10 percent in each of the geographic regions used in this report (see Chapter 9). Because of differences in the average yields in each region and projected shifts in output among regions, the national average increase in yield is somewhat below 10 percent.

[77] Roundwood is derived both from the "growing stock" component of the forest (that is, live trees on commercial timberlands above 5.0 inches in diameter meeting certain standards of soundness and quality) and from other sources such as cull and dead trees and trees on noncommercial and nonforest lands. Projected supplies of roundwood from these sources are shown in Chapters 7 and 8.

Table 3.37—*Roundwood consumption in the United States, by softwoods and hardwoods and product, 1952, 1962, 1970, and 1976, with projections of demand (base level price trends) to 2030*

(Billion cubic feet, roundwood equivalent)

Species group and product	1952	1962	1970	1976	Projections[1]														
					Low					Medium					High				
					1990	2000	2010	2020	2030	1990	2000	2010	2020	2030	1990	2000	2010	2020	2030
Softwoods																			
Saw logs	5.0	4.8	4.9	5.4	7.1	6.8	7.2	7.2	6.6	7.5	7.5	7.9	7.7	7.5	7.8	8.1	8.9	8.4	8.7
Veneer logs	.2	.7	.9	1.2	1.6	1.5	1.7	1.8	1.8	1.7	1.8	1.9	1.9	1.9	1.7	1.8	2.1	2.0	2.1
Pulpwood[2]	2.4	2.6	3.4	3.3	5.0	5.8	6.4	6.8	6.9	5.2	6.3	7.0	7.7	8.3	5.5	6.8	7.9	9.2	10.3
Miscellaneous products[3]	.3	.2	.2	.2	.4	.4	.5	.4	.4	.4	.4	.5	.5	.5	.4	.5	.6	.6	.7
Fuelwood	.5	.2	.1	.1	.2	.3	.3	.3	.4	.2	.3	.4	.4	.5	.2	.3	.5	.5	.6
Total[4]	8.4	8.5	9.5	10.4	14.3	14.8	16.1	16.5	16.1	15.0	16.3	17.7	18.2	18.7	15.6	17.5	20.0	20.7	22.4
Hardwoods																			
Saw logs	1.1	1.0	1.1	1.1	1.6	1.6	1.8	2.0	2.0	1.6	1.7	2.0	2.2	2.3	1.7	1.9	2.1	2.4	2.6
Veneer logs	.2	.2	.3	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
Pulpwood[2]	.3	.7	1.0	1.1	2.0	2.4	2.8	3.2	3.6	2.1	2.7	3.2	3.9	4.6	2.2	3.0	3.8	4.8	6.0
Miscellaneous products[3]	.4	.2	.2	.1	.3	.3	.3	.4	.4	.3	.4	.4	.4	.4	.3	.4	.4	.4	.5
Fuelwood	1.5	.9	.4	.5	.8	1.1	1.3	1.5	1.5	.9	1.2	1.5	1.8	1.9	1.0	1.3	1.8	2.3	2.5
Total[4]	3.5	3.1	3.0	3.0	5.1	5.8	6.6	7.5	7.9	5.3	6.4	7.5	8.7	9.6	5.6	7.0	8.5	10.3	12.0
All species																			
Saw logs	6.1	5.8	6.0	6.5	8.7	8.4	9.0	9.2	8.6	9.1	9.2	9.9	9.9	9.8	9.5	10.0	11.0	10.8	11.3
Veneer logs	.4	.9	1.2	1.5	2.0	1.9	2.1	2.2	2.2	2.1	2.2	2.3	2.3	2.3	2.1	2.2	2.5	2.4	2.5
Pulpwood[2]	2.7	3.3	4.4	4.4	7.0	8.2	9.2	10.0	10.5	7.3	9.0	10.2	11.6	12.9	7.7	9.8	11.7	14.0	16.3
Miscellaneous products[3]	.7	.5	.4	.4	.7	.7	.8	.8	.8	.7	.8	.9	.9	.9	.7	.9	1.0	1.0	1.2
Fuelwood	2.0	1.1	.5	.6	1.0	1.4	1.6	1.8	1.9	1.1	1.5	1.9	2.2	2.4	1.2	1.6	2.3	2.8	3.1
Total[4]	11.9	11.6	12.5	13.4	19.4	20.6	22.7	24.0	24.0	20.3	22.7	25.2	26.9	28.3	21.2	24.5	28.5	31.0	34.4

[1]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.
[2]Includes both pulpwood and the pulpwood equivalent of the net imports of paper, board, and woodpulp.
[3]Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, roundwood used in particleboard manufacture, and other miscellaneous items.
[4]Includes imported logs not shown by product use.

Note: Date may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; and the American Plywood Association.

Projections: U.S. Department of Agriculture, Forest Service.

Demand for hardwoods is projected to more than triple from 3.0 to 9.6 billion cubic feet. The faster rate of growth in demand for hardwoods largely reflects the projected rise in demand for hardwood roundwood for pulpwood, hardwood lumber for pallets, and hardwood plywood and veneer for furniture manufacture.

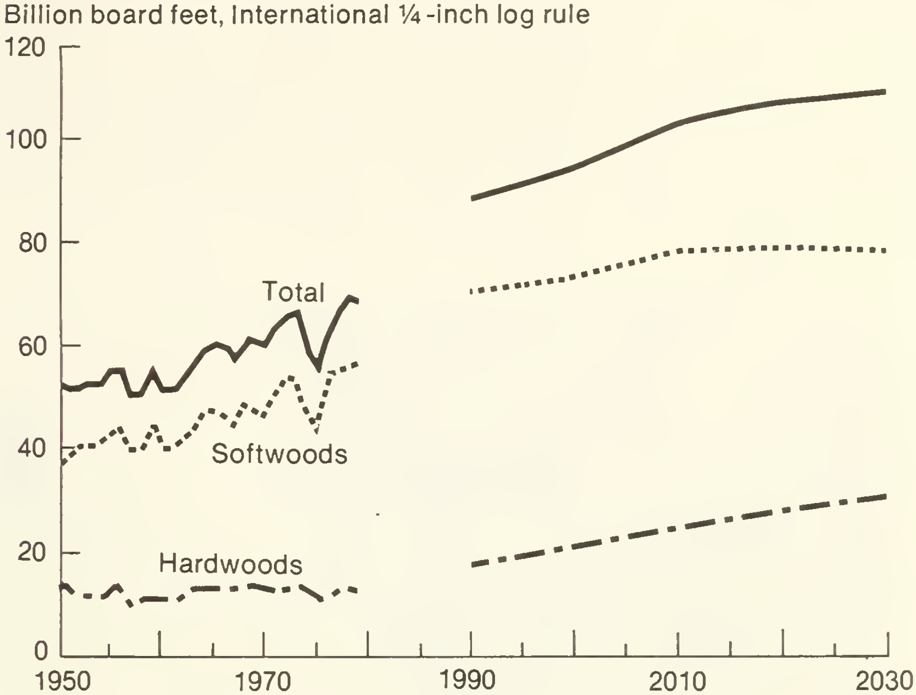
Projected Demand for Sawtimber. About three-fourths of the roundwood consumed in 1976 came from the sawlog portion of sawtimber trees (Append. 3, table 3.67). Trends in consumption of sawtimber in the past couple of decades have been very similar to the trends for total roundwood, that is, not much rise in the 1950's but a fairly rapid upward movement in the 1960's and early 1970's (table 3.38, fig. 3.17; Append. 1, tables 1.29–1.31).

With base level price trends, projected demand (medium level) for sawtimber rises from 63.0 billion board feet in 1976 to 109.5 billion board feet in 2030—an increase of 74 percent. Among the various products, sawtimber used for pulpwood shows the largest growth, rising about 3.1 times.

Although projected demands for both species groups rise over the projection period, demand for hardwood sawtimber shows the largest percentage increase moving up from 11.7 billion board feet in 1976 to 30.9 billion board feet in 2030 (medium projection—base level price trends), a rise of some 164 percent. Softwood sawtimber demand, on the other hand, increases about 53 percent from 51.3 billion board feet to 78.6 billion board feet. As a result of these trends about 28 percent of total sawtimber demand in 2030 is projected to be for hardwood species, much above the 19 percent consumed in 1976.

Figure 3.17

Sawtimber Consumption, 1950-79, with Projections* to 2030



*Base level price trends

The alternative assumptions on population and economic growth result in a substantial range in projected demand for sawtimber. By 2030, projected demands with base level price trends vary from about 94 to 132 billion board feet—levels that are respectively 14 percent below and 21 percent above the medium level.

The projections discussed above represent domestic demands for roundwood and sawtimber. A part of these demands will be met by imports. There will also be a substantial export demand. Thus in deriving estimates of future demands on domestic forests, international trade in timber products must be taken into account. Recent and prospective trends in timber products trade are discussed in the next chapter.

Table 3.38—*Sawtimber consumption in the United States, by softwoods and hardwoods and product, 1952, 1962, 1970, and 1976, with projections of demand (base level price trends) to 2030*

(Billion board feet, International 1/4-inch log rule)

Species group and product	1952	1962	1970	1976	Projections[1] Low 1990	Low 2000	Low 2010	Low 2020	Low 2030	Medium 1990	Medium 2000	Medium 2010	Medium 2020	Medium 2030	High 1990	High 2000	High 2010	High 2020	High 2030
Softwoods																			
Saw logs	31.8	30.8	32.8	34.5	44.5	42.8	44.9	44.7	41.5	46.8	46.7	49.5	48.1	46.6	48.9	50.4	55.4	52.5	54.6
Veneer logs	1.9	4.9	6.8	8.3	10.2	10.0	10.5	10.8	10.3	10.6	10.9	11.6	11.7	11.6	11.2	11.7	12.9	12.8	13.5
Pulpwood	4.3	5.0	7.3	7.3	10.8	12.3	13.4	14.2	14.6	11.4	13.7	15.2	16.9	18.3	12.0	15.1	17.7	20.8	24.0
Miscellaneous products[2]	1.2	.9	1.0	1.0	1.2	1.3	1.4	1.3	1.4	1.3	1.4	1.5	1.6	1.7	1.4	1.5	1.8	1.9	2.1
Fuelwood	.6	.1	.1	.1	.1	.2	.2	.2	.2	.1	.2	.2	.3	.3	.1	.2	.2	.4	.4
Total[3]	39.9	41.7	48.0	51.3	66.9	66.7	70.5	71.3	68.1	70.3	73.0	78.1	78.7	78.6	73.7	79.0	88.1	88.5	94.7
Hardwoods																			
Saw logs	7.1	6.5	7.5	6.3	9.2	9.6	10.5	11.5	12.0	9.3	10.2	11.5	12.8	13.7	9.8	10.9	12.5	14.1	15.3
Veneer logs	1.2	1.5	1.9	1.7	2.0	2.2	2.3	2.3	2.2	2.1	2.3	2.4	2.5	2.4	2.2	2.4	2.6	2.6	2.6
Pulpwood	.4	2.2	2.2	2.6	4.5	6.0	7.3	8.5	9.5	4.7	6.6	8.4	10.2	12.0	5.0	7.3	9.7	12.6	15.8
Miscellaneous products[2]	1.2	.6	.7	.5	1.0	1.1	1.0	1.1	1.0	1.0	1.1	1.2	1.2	1.2	1.0	1.3	1.3	1.4	1.5
Fuelwood	1.7	.7	.3	.6	.7	.9	1.0	1.2	1.2	.7	1.0	1.2	1.5	1.6	.7	1.1	1.4	1.9	2.1
Total[3]	11.7	11.7	12.7	11.7	17.4	19.8	22.1	24.6	25.9	17.8	21.2	24.7	28.2	30.9	18.7	23.0	27.5	32.6	37.3
All species																			
Saw logs	39.0	37.2	40.3	40.8	53.7	52.4	55.4	56.2	53.5	56.1	56.9	61.0	60.9	60.3	58.7	61.3	67.9	66.6	69.9
Veneer logs	3.1	6.4	8.7	10.0	12.2	12.2	12.8	13.1	12.5	12.7	13.2	14.0	14.2	14.0	13.4	14.1	15.5	15.4	16.1
Pulpwood	4.7	7.2	9.5	9.9	15.3	18.3	20.7	22.7	24.1	16.1	20.3	23.6	27.1	30.3	17.0	22.4	27.4	33.4	39.8
Miscellaneous products[2]	2.4	1.5	1.6	1.5	2.2	2.4	2.4	2.4	2.4	2.3	2.5	2.7	2.8	2.9	2.4	2.8	3.1	3.3	3.6
Fuelwood	2.3	.8	.4	.7	.8	1.1	1.2	1.4	1.4	.8	1.2	1.4	1.8	1.9	.8	1.3	1.6	2.3	2.5
Total[3]	51.6	53.3	60.7	63.0	84.3	86.5	92.6	95.9	94.0	88.1	94.2	102.8	106.9	109.5	92.4	102.0	115.6	121.1	132.0

[1]Projections based on alternative assumptions about growth in population and economic activity as specified in Chapter 2.
[2]Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, roundwood used in particleboard manufacture, and other miscellaneous items.
[3]Includes imported logs not shown by product use.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; and the American Plywood Association.

Projections: U.S. Department of Agriculture, Forest Service.

Chapter 4
International Trade in Timber Products

Chapter 4. International Trade In Timber Products

Rapid economic growth in the developed countries coupled with a liberalization of the constraints on trade has resulted in a large expansion in the volume of trade in timber products in the major timber producing and consuming countries since World War II. The United States has shared in this expansion. The Nation has come to depend to an increasing degree on Canada and other countries as a source of supply for some timber products and especially softwood lumber, hardwood plywood and veneer, and newsprint. At the same time, exports of some timber products such as softwood logs, pulp products and lumber have been rising and the United States has become an important source of supply for many countries and especially Japan and the countries in western Europe.

Trends in Imports of Timber Products

The United States is the world's leading importer of timber products. In 1979, the volume of these imports was 3.7 billion cubic feet, roundwood equivalent (table 4.1, fig 4.1). This was more than twice the 1.5 billion cubic feet imported in 1950 and composed about 25 percent of total roundwood consumption. The value of U.S. imports of timber products has also increased rapidly and in 1979 totaled $9.2 billion, 4.5 percent of the total value of all merchandise imports (table 4.2).

Lumber. Lumber is a major timber product import in terms of both volume and value (table 4.2). Between 1950 and 1979, lumber imports rose from 0.5 billion cubic feet, roundwood equivalent (3.4 billion board feet), to 1.8 billion cubic feet (11.5 billion board feet), a rise that accounted for over half of the total growth in import volume during that period. These imports accounted for about 24 percent of the lumber consumed in 1979.

Nearly all of the growth in lumber imports in the 1950–79 years was composed of softwoods from Canada, chiefly from British Columbia (Append. 2, table 2.1). Most of this lumber went to the major consuming areas in the Northeast and North Central regions but significant volumes were shipped to all parts of the United States. Hardwood lumber imports, mostly from the tropical regions of the world and Canada, have fluctuated between 0.2 and 0.5 billion board feet per year during the past couple of decades with a slight upward trend.

Figure 4.1

Imports and Exports of Timber Products in the United States, 1950-79

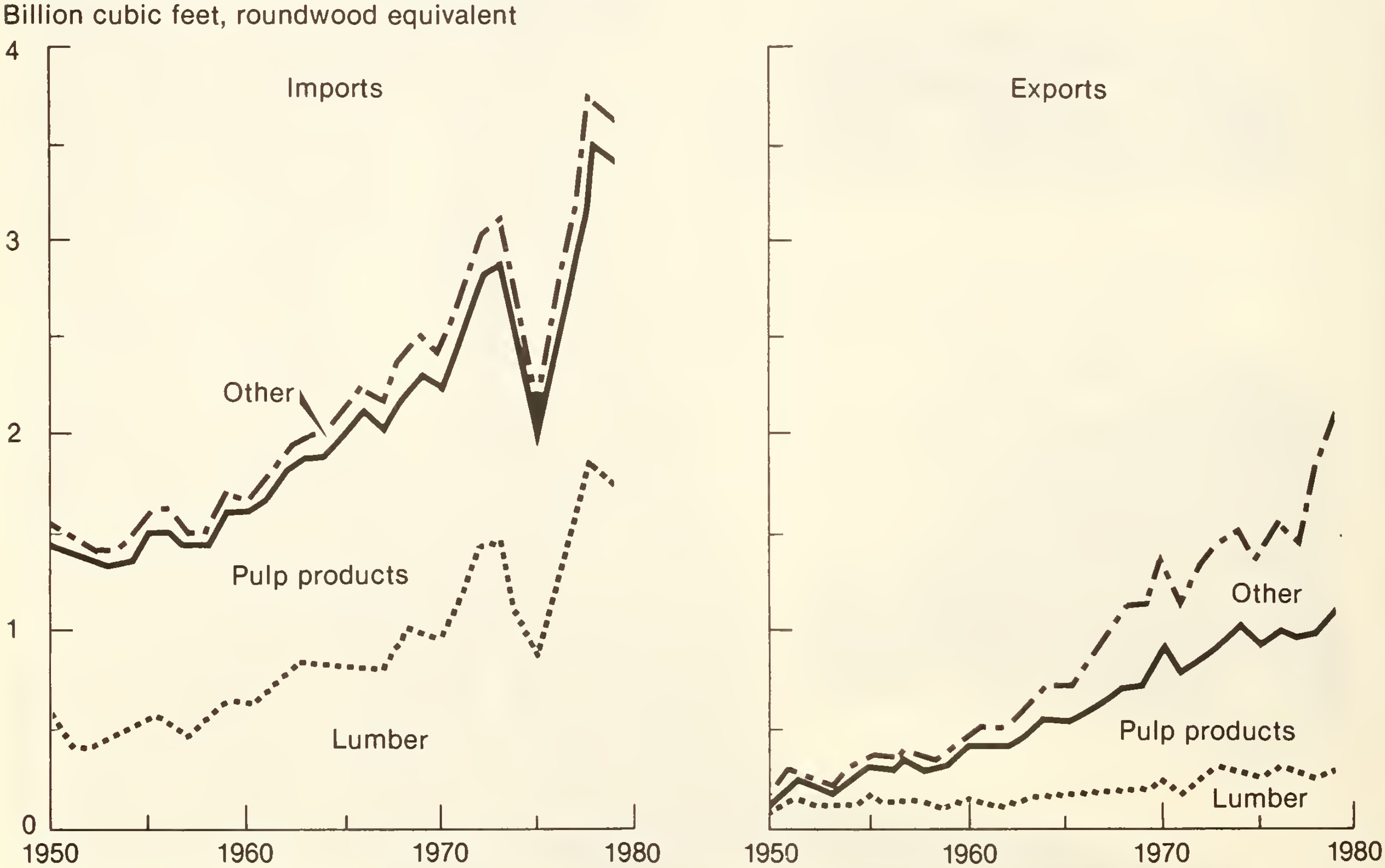


Table 4.1—*Timber product imports into the United States, by product, specified years 1950–79, with projections (base level price trends) to 2030*

(Billion cubic feet, roundwood equivalent)

Year	Total	Lumber			Veneer and plywood			Pulp products				Logs		
		Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	Wood-pulp	Paper and board[1]	Pulp-wood[2]	Total	Soft-woods	Hard-woods
1950	1.5	0.5	0.5	([3])	([3])	([3])	([3])	0.9	0.3	0.5	0.1	([3])	([3])	([3])
1955	1.6	.6	.5	([3])	([3])	([3])	([3])	1.0	.3	.5	.1	([3])	([3])	([3])
1960	1.7	.6	.6	([3])	0.1	([3])	0.1	1.0	.3	.6	.1	([3])	([3])	([3])
1965	2.1	.8	.8	0.1	.1	([3])	.1	1.2	.4	.7	.1	([3])	([3])	([3])
1970	2.4	1.0	.9	.1	.2	([3])	.2	1.3	.5	.7	.1	([3])	([3])	([3])
1971	2.7	1.1	1.1	.1	.2	([3])	.2	1.3	.5	.8	.1	([3])	([3])	([3])
1972	3.1	1.4	1.3	.1	.3	([3])	.3	1.4	.5	.8	.1	([3])	([3])	([3])
1973	3.2	1.5	1.4	.1	.2	([3])	.2	1.5	.5	.8	.1	([3])	([3])	([3])
1974	2.8	1.1	1.0	.1	.2	([3])	.1	1.5	.6	.8	.1	([3])	([3])	([3])
1975	2.2	.9	.9	([3])	.2	([3])	.2	1.1	.4	.6	.1	([3])	([3])	([3])
1976	2.8	1.3	1.2	([3])	.2	([3])	.2	1.3	.5	.7	.1	([3])	([3])	([3])
1977	3.3	1.7	1.6	.1	.2	([3])	.2	1.4	.5	.8	.1	([3])	([3])	([3])
1978	3.8	1.9	1.8	.1	.2	([3])	.2	1.6	.5	.9	.1	([3])	([3])	([3])
1979	3.7	1.8	1.7	.1	.2	([3])	.2	1.6	.6	.9	.1	([3])	([3])	([3])
Projections														
1990	4.3	2.3	2.2	.1	.3	([3])	.3	1.7	.7	.9	.1	([3])	([3])	([3])
2000	4.3	2.1	2.0	.1	.3	([3])	.3	1.9	.8	1.0	.1	([3])	([3])	([3])
2010	4.5	2.1	2.0	.1	.3	([3])	.3	2.1	.9	1.1	.1	([3])	([3])	([3])
2020	4.5	2.0	1.9	.1	.3	([3])	.3	2.2	.9	1.2	.1	([3])	([3])	([3])
2030	4.5	1.9	1.8	.1	.3	([3])	.3	2.3	.9	1.3	.1	([3])	([3])	([3])

[1]Includes paper and board products.
[2]Includes roundwood and chips.
[3]Less than 50 million cubic feet.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census, and the American Paper Institute.

Table 4.2—*Timber product imports and exports for the United States, by product, 1979*

Product	Unit of measure	Imports[1] Volume	Imports[1] Value[2]	Exports Volume	Exports Value[3]
			Million dollars		*Million dollars*
Logs					
Softwoods	Million board feet	118.4	26.4	3,768.2	1,613.6
Hardwoods	do	14.6	2.7	128.8	138.1
Total	do	132.9	29.2	3,897.0	1,751.7
Lumber					
Softwoods	do	11,121.6	2,545.1	1,745.3	785.1
Hardwoods	do	377.6	189.7	306.6	211.9
Railroad ties	do	29.3	3.6	90.5	18.4
Total	do	11,528.5	2,738.4	2,142.4	1,015.4
Veneer					
Softwoods	Million square feet	516.5	18.8	186.5	13.0
Hardwoods	do	1,560.1	99.2	886.0	78.4
Total	do	2,076.5	118.0	1,072.5	91.4
Plywood					
Softwoods	do	26.8	6.2	401.8	98.8
Hardwoods	do	4,216.3	584.8	33.5	8.5
Total	do	4,243.2	591.0	435.3	107.2
Pulpwood					
Round	Thousand cords	206.1	8.9	263.7	11.5
Chips	do	1,198.3	30.4	3,528.4	197.8
Total	do	1,404.3	39.3	3,792.1	209.3
Woodpulp	Thousand tons	4,317.5	1,465.2	2,934.8	1,103.8
Paper and board					
Newsprint	do	7,222.7	2,300.5	71.5	32.0
Other paper and board	do	2,066.7	722.6	3,070.4	1,307.5
Paper and board products	do	96.1	223.1	562.3	585.6
Total	do	9,385.5	3,246.2	3,704.2	1,925.2
Other timber products[4]			953.4		670.1
All timber products			9,180.6		6,874.1

[1]Imports for consumption.
[2]Customs value, which generally represents a value in the foreign country and therefore excludes U.S. import duties, freight, insurance, and other charges.
[3]Value (free alongside ship) at U.S. ports of export, based on the transaction price, including inland freight, insurance, and other charges.
[4]Includes poles and piling, fuelwood, wood charcoal, cork, waste paper, wood containers, wood doors, and other miscellaneous products. Does not include wood furniture or printed material.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of Census. *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual, 1979, and *U.S. exports: schedule E commodity by country.* FT 410. Monthly. December 1979.

The United States has become increasingly dependent on imports of hardwood plywood and veneer. Most of the logs used to manufacture these products originate in tropical hardwood forests.

The value of lumber imports has also been rising and in 1979, totaled 2.7 billion—about 30 percent of the total value of timber products imports.

Pulp Products. The roundwood equivalent of imports of wood pulp, newsprint, other grades of paper and board and pulpwood in 1979 was 1.6 billion cubic feet, over one and a half times the 0.9 billion cubic feet imported in 1950. Practically all of these imports originated in Canada (Append. 2, tables 2.2 and 2.3). Newsprint has dominated imports of paper and board, accounting for 77 percent of the total volume in 1979. The volume of wood pulp and pulpwood imports, mostly in the form of chips, is also substantial (Append. 2, table 2.4).

While imports of pulp products have been rising, the increase has not been as rapid as the growth in consumption. As a result, there has been some decline in relative importance. Imports of pulp products amounted to 33 percent of U.S. consumption in 1979 down from 38 percent in the early 1950's.

The value of imports of pulp products has followed the trends in volume. In 1979, these imports were valued at $4.8 billion, over half the value of imports of all timber products. Newsprint accounted for about 48 percent of the value of the pulp product imports and wood pulp most of the remainder.

Plywood and Veneer. The United States has become increasingly dependent on imports of hardwood veneer and plywood with imports rising from 3 percent of United States consumption in the early 1950's to over 65 percent of the total in the 1970's. Import volume has grown from 5 million cubic feet, roundwood equivalent, in 1950 to about 200 million in 1979. Practically all of these imports have been hardwoods coming in from Korea, Taiwan, Japan, and the Philippines (Append. 2, tables 2.5 and 2.6). Most of the timber used in the manufacture of this plywood and veneer, however, originated in tropical hardwood forests in the Philippines, Malaysia, and Indonesia.

In contrast to hardwoods, softwood plywood imports, primarily from Canada, have never exceeded 10 million cubic feet, roundwood equivalent, in any one year and have been an insignificant part of U.S. supply.

In 1979, imports of veneer and plywood were valued at $709 million—about 8 percent of the total value of imported timber products.

Other. In addition to the above products, wood containers, wood charcoal, particleboard, logs, fuelwood, and various other roundwood products such as posts and poles have been imported on a regular basis. Most of these imports have been cross-border trade with Canada. The value of these imports in 1979

was $1.0 billion, about 10 percent of the total value of the imports of all products.

Trends in Exports of Timber Products

Since 1950, exports of timber products have been following about the same upward trend as imports, rising from 0.1 billion cubic feet, roundwood equivalent, to 2.1 billion in 1979 (table 4.3, fig. 4.1). Exports in 1979 composed about 16 percent of U.S. production, up from 1 percent in 1950.

The value of U.S. exports of timber products has also grown rapidly, and in 1979 amounted to $6.9 billion—about 3.8 percent of total U.S. merchandise exports (table 4.2).

Lumber. As in the case of imports, growth in timber product exports has not been evenly distributed among the major timber products. Exports of lumber showed little change from the early 1950's through the mid-1960's. Starting then, they began to rise and reached a record high of 295 million cubic feet roundwood equivalent (2 billion board feet) in 1973. Since 1973, they have fluctuated at levels somewhat below this peak. In 1979, they totaled 335 million cubic feet (2.1 billion board feet) and composed about 15 percent of the value of all timber product exports in that year.

Softwoods accounted for nearly all of the increase in exports in the late 1960's and 1970's. A substantial part of the additional exports in this period went to Japan (Append. 2, table 2.7). Shipments to Canada and Europe also rose. There was no persistent trend in hardwood lumber exports through the early 1970's. Since then, however, there have been significant increases, chiefly to Canada.

Pulp Products. Exports of pulp products increased fairly steadily throughout the 1950–74 years, going from 50 to a high of 805 million cubic feet, roundwood equivalent. From 1974 through 1979, shipments did not change much, staying close to 800 million cubic feet a year.

Wood pulp exports mostly to Japan and Western Europe have accounted for part of the growth in the exports of pulp products (Append. 2, table 2.8). Paper and board exports have risen to all regions but shipments to Canada, Japan, Western Europe and Central and South America have exhibited especially fast growth in recent years (Append. 2, table 2.9). In 1979, pulp and paper and board exports amounted to about 20 percent of U.S. production. Most of the wood pulp and paper and board exports originated in the South, Pacific Northwest, and Alaska.

Pulp chips produced from slabs, edgings and other byproducts of primary timber processing have also increased and made up a growing part of the shipments of pulp products to Japan since shipments began in the mid-1960's (Append. 2, table 2.10). All chip exports to Japan have originated on the Pacific Coast and since the mid-1970's have averaged over 0.2 billion cubic feet a year. A growing, but still small, export of chips from the South to Scandinavia also has developed since the mid-1970's. In addition, small volumes of round pulpwood have been exported to Canada on a regular basis.

The total value of the exports of pulp products in 1979 was $3.2 billion, about 47 percent of the total value of timber product exports. Paper and board and wood pulp accounted for over nine-tenths of this value.

Logs. The volume of logs exported has grown rapidly since the early 1950's rising from 10 million cubic feet to 665 million cubic feet in 1979 (3.9 billion board feet local log scale). By far the largest part of these exports consisted of softwood logs (3.8 billion board feet in 1979), with about four-fifths of these going to Japan (Append. 2, tables 2.11 and 2.12). Since the mid-1960's, exports to Canada—also nearly all softwoods—have ranged between 300 and 400 million board feet a year. In total, softwood log exports composed about 8 percent of the softwood sawtimber harvest in 1976, the latest year for which harvest data are available.

Hardwood log exports, though small in relation to softwoods, are largely made up of high value and relatively scarce species and thus have had some important effects on domestic markets. For example, export of walnut logs, principally to western Europe, has been a contributing cause to very large increases in walnut log and stumpage prices.

In 1979, the value of log exports was $1.8 billion, 25 percent of the value of all timber product exports. This is a high in a trend that has been rising rapidly in response to the increased volume of exports and rising log prices. Devaluation of the U.S. dollar relative to Japanese and many western European currencies has also contributed to the increase.

The export of high quality hardwood logs, and the associated impacts on log and stumpage prices, has been the subject of some controversy. Softwood log exports have been the subject of a much larger controversy during the past couple of decades. This controversy is centered in the Pacific Northwest where over 85 percent of the softwood log exports originate. About 70 percent of the softwood log exports from this region come from private lands, nearly all from those in forest industry ownership, and 30 percent from lands managed by the State of Washington. Export of logs cut from timber on Federal lands and State of Oregon lands is prohibited, with minor exceptions, by Federal and State laws.[1]

Opponents of softwood log exports have generally argued that if these logs were not exported, they would be processed domestically, contributing to employment and helping to lower domestic stumpage and softwood end product prices. Proponents have generally argued that little of the volume exported under current regulations would be processed domestically and that the export market contributes to employment and improved timber management.

The effects, in Japan and the United States, of further restrictions on softwood log exports cannot be predicted with any certainty. They would depend in large part on Japanese reactions. Logs from the United States compose about 25 percent of Japan's consumption of softwood sawlogs and are used primarily for the manufacture of lumber consumed in the construction of housing in Japan. In addition, chips produced as a byproduct of lumber manufacture are used in the manufacture of wood pulp in Japan.

If U.S. log exports were restricted, the Japanese would have a number of options to replace the logs or the products—the lumber and wood pulp—that would have been manufactured from U.S. logs. The Japanese could expand imports of logs from New Zealand, the Soviet Union, and to a lesser extent, Chile; they could increase the harvest of timber in Japan; they could substitute hardwood and non-wooden construction materials for softwood lumber used in home construction and increase chip imports from the United States, Canada, and other sources to maintain the Japanese wood pulp industry; they could increase lumber imports from the United States and Canada and increase chip imports; or they could increase lumber and pulp imports.

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[1] Lindell, Gary R. Log export restrictions of the western States and British Columbia. U.S. Dep. Agric., Forest Serv., Gen. Tech. Rep. PNW-63, Pacific Northwest Forest and Range Exp. Sta., Portland, Oreg. 14 p., illus. 1978.

Table 4.3—*Timber product exports from the United States, by product, specified years 1950–79, with projections (base level price trends) to 2030*

(Billion cubic feet, roundwood equivalent)

Year	Total	Lumber			Veneer and plywood			Pulp products				Logs		
		Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	Wood-pulp	Paper and board[1]	Pulp-wood[2]	Total	Soft-woods	Hard-woods
1950	0.1	0.1	0.1	[3]	[3]	[3]	[3]	0.1	[3]	[3]	[3]	[3]	[3]	[3]
1955	.3	.1	.1	[3]	[3]	[3]	[3]	.2	0.1	0.1	[3]	[3]	[3]	[3]
1960	.5	.1	.1	[3]	[3]	[3]	[3]	.3	.2	.1	[3]	[3]	[3]	[3]
1965	.7	.1	.1	[3]	[3]	[3]	[3]	.4	.2	.2	[3]	0.2	0.2	[3]
1970	1.5	.2	.2	[3]	[3]	[3]	[3]	.9	.4	.3	0.2	.5	.5	[3]
1971	1.3	.2	.1	[3]	[3]	[3]	[3]	.7	.3	.3	.1	.4	.4	[3]
1972	1.5	.2	.2	[3]	[3]	[3]	[3]	.8	.3	.3	.2	.5	.5	[3]
1973	1.6	.3	.3	[3]	[3]	[3]	[3]	.8	.3	.3	.2	.6	.6	[3]
1974	1.8	.3	.2	[3]	[3]	[3]	[3]	1.0	.4	.4	.2	.5	.4	[3]
1975	1.7	.3	.2	[3]	0.1	0.1	[3]	.9	.4	.3	.2	.5	.4	[3]
1976	1.9	.3	.3	[3]	.1	.1	[3]	1.0	.3	.3	.3	.6	.5	[3]
1977	1.8	.3	.2	[3]	[3]	[3]	[3]	1.0	.4	.3	.3	.5	.5	[3]
1978	1.8	.3	.2	0.1	[3]	[3]	[3]	.9	.4	.3	.2	.6	.6	[3]
1979	2.1	.3	.3	.1	[3]	[3]	[3]	1.1	.4	.4	.3	.7	.6	[3]
Projections														
1990	2.1	.3	.3	[3]	.1	.1	[3]	1.2	.4	.4	.3	.5	.5	[3]
2000	2.0	.3	.3	[3]	.1	.1	[3]	1.2	.5	.5	.3	.4	.4	[3]
2010	2.0	.4	.3	.1	[3]	[3]	[3]	1.2	.5	.5	.2	.4	.4	[3]
2020	2.0	.3	.2	.1	[3]	[3]	[3]	1.3	.5	.6	.2	.4	.4	[3]
2030	1.9	.3	.2	.1	[3]	[3]	[3]	1.3	.5	.6	.2	.3	.3	[3]

[1]Includes paper and board products.
[2]Includes roundwood and chips.
[3]Less than 50 million cubic feet.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census, and the American Paper Institute.

Although Japanese responses to a ban of U.S. log exports cannot be predicted with certainty, the Japanese would probably try to make the best of the situation by utilizing the available opportunities. If the Japanese responded in this manner, a ban of U.S. softwood log exports would result in only relatively minor changes on U.S. markets and prices. In addition, the Japan-Canada-United States triangular trade in softwood logs and lumber would limit the effects of restricting softwood log exports on U.S. softwood lumber markets. For example, if Japan did purchase additional lumber from the Pacific Northwest after restrictions on log exports, lumber imports from Canada and production in other regions of the United States would increase in response to an associated rise in prices. This, in turn, would alleviate the impact of expanded exports from the United States on domestic end-product prices.

If the Japanese responded to a ban of softwood log exports in the manner discussed above, it is likely that there would be significant impacts in the stumpage markets of the Pacific Northwest, especially western Washington. A ban of softwood log exports would reduce the demand for stumpage, thereby lowering prices for stumpage in this area. These lower prices would benefit timber processors at the expense of stumpage owners.

Timber owners in the Pacific Northwest could respond to restrictions on log exports in various ways—ranging from trying to sell more logs in the domestic market, to building additional processing facilities, to storing the timber on the stump in the hope that rising timber prices would make storage worthwhile. Timber processors in the Pacific Northwest could expand capacity and attempt to sell the additional lumber output in the domestic or Japanese market.

A recent study[2] simulated in a quantitative way the effects of alternative Japanese, Canadian, and U.S. responses to a ban on softwood log exports. This analysis showed that, in general, such a ban would reduce softwood lumber prices in the United States only if Japan turned to sources outside North America for construction materials and only if lumber processing capacity expanded significantly on the West Coast of the United States. The softwood lumber price decline associated with these types of market responses would be on the order of 2 to 3 percent. Stumpage prices would tend to fall in all U.S. supply regions, with the largest drop—on the order of 10 percent—in the Pacific Northwest.

The analysis further showed that softwood lumber prices in the United States would rise on the order of 2 to 3 percent if the Japanese purchased lumber from North America to replace the log imports and if processing capacity did not expand significantly. With these responses, stumpage prices in the Pacific Northwest would decline by roughly 10 percent and by a larger amount in western Washington.

Plywood and Veneer. Annual exports of plywood, mostly softwoods, never exceeded 10 million cubic feet, roundwood equivalent, until 1969. During the 1970's, export volume increased sharply reaching a peak of 55 million cubic feet (791 million square feet, 3/8-inch basis) in 1975, about 5 percent of U.S. production. For the most part, these exports have originated in Washington and Oregon, and they have had Canada and western Europe as the primary destinations. There was an increase in plywood exports in 1979 but exports of veneer, mostly hardwoods, to Canada and western Europe declined.

The value of veneer and plywood exports was $199 million in 1979—3 percent of the value of all exports of timber products.

Other Products. There are small volumes of a variety of other products such as poles, piling, and posts exported each year. However, the volumes are small and not a significant factor in domestic timber markets.

Further, with the exception of the Pacific Northwest and Alaska, exports of most timber products, including lumber, pulp products and logs, are not a major factor in U.S. timber markets. From a national perspective, exports as a percentage of production in the mid-1970's were 5 percent for softwood plywood, 6 percent for wood pulp, and less than 7 percent for paper and board, exclusive of other products.

While exports do increase demand on the Nation's timber resources, it is not clear what would have happened to the use of these timber resources in the absence of foreign sales. For example, some sawmills and some pulp, paper, and board mills have been constructed in response to foreign rather than domestic markets. In addition, to the extent that foreign sales increase prices for timber products, they increase the incentives for intensification of timber

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[2] Darr, David R., R. W. Haynes, and Darius M. Adams. The impact of the export and import of raw logs on domestic timber supplies and prices. Pacific Northwest Forest and Range Exp. Sta., Portland, Oreg. (In press.)

Other papers and studies have discussed various aspects of the log export trade and may be useful as additional background on the issues involved in policies that might affect the trade:

Alston, Richard M. Political attitudes and their effects on North American trade and investment in forest products—a theoretical approach. Proceedings: 66th Western Forestry Conference. Western Forestry and Conservation Association, Portland, Oreg. p. 32–39. 1976.

Clawson, Marion. Forests—for whom and for what? Published for Resources for the Future, Inc. by The Johns Hopkins University Press. Baltimore, Md., 175 p. 1976.

Darr, David R. Softwood log exports and the value and employment issues. U.S. Dep. Agric., Forest Serv., Res. Pap. PNW-200, Pacific Northwest Forest and Range Exp. Sta., Portland, Oreg., 13 p., illus. 1975.

Darr, David R. Floating exchange rates and log export policy. J. Forestry 75(2):88–90. 1977.

Darr, David R. The impacts of international trade in domestic markets. Proceedings; The impact of change on the management of private forest lands in the Northwest, U.S. Dep. Agric., Pacific Northwest Forest and Range Exp. Sta., Portland, Oreg. 1979.

Darr, David R. Softwood log export policy: The key questions. J. Forestry 78(3):138–140 and 151. 1980.

Hamilton, Thomas E. Log export policy: theory vs. reality. J. Forestry 69(8):494–497. 1971.

Haynes, Richard W. Price impacts of log export restrictions under alternative assumptions. U.S. Dep. Agric., Forest Serv., Res. Pap. PNW-212, Pacific Northwest Forest and Range Exp. Sta., Portland, Oreg., 25 p., illus. 1976.

Lindell, Gary R. Substitution and the U.S. Dep. Agric., Forest Service log export restrictions. U.S. Dep. Agric., Forest Serv., Res. Note PNW-355, Pacific Northwest Forest and Range Exp. Sta., Portland, Oreg. 1980.

Sedjo, Roger (ed.). Issues in U.S. international forest products trade. Proceedings of a workshop. (Research Paper.) Resources for the Future, Inc., Washington, D.C. (In process.)

Stanford Research Institute. Benefits and costs of alternative log export policies—phase one report and alternative log export policies for long term—phase two report. Unpublished report prepared for the Pacific Northwest Regional Commission, Vancouver, Wash. 1974.

Wiener, Alfred A. Export of forest products: Would cutting off log exports lower prices of wood products? J. Forestry 91(4):215–216. 1973.

management and utilization, especially on private lands.

Trends in Net Imports of Timber Products

In most years since 1950, net imports of timber products have fluctuated between 1.2 and 1.6 billion cubic feet a year and composed around 10 percent of total U.S. consumption. In the 1970's, however, there has been some indication of a rising trend. In 1978, for example, they amounted to 1.9 billion cubic feet—about 13 percent of consumption.

In the 1960's and early 1970's, the trade balances in terms of value were similar to physical balances: imports exceeded exports by about $1 billion each year. In the 1970's, the differential effects of international business cycles caused shifts in the trade balance. The deficit jumped to $1.6 billion in 1972 but dropped to near zero by 1975. In 1979, the deficit was $2.3 billion (table 4.2). Much of the movement in the balance of trade in timber products has been attributable to fluctuations in U.S. imports of softwood lumber from Canada.

There have been contrasting trends in the net imports of the major timber products since 1950 (Append. 2, table 2.13). Net imports of lumber have varied from 450 million cubic feet (3 billion board feet) to 1.6 billion (10.4 billion board feet). These volumes, respectively, represent 7 percent and 22 percent of total consumption.

In percentage terms, net imports of hardwood plywood and veneer showed even more rapid increases rising from 5 million cubic feet (roundwood equivalent), an insignificant part of total consumption, to 195 million in 1978, 67 percent of consumption. These net imports are entirely hardwoods. In 1979, there was a net export of softwood plywood and veneer of 20 million cubic feet, 2 percent of U.S. production.

Net imports of pulp products showed no consistent trend in the 1950-79 period. As a result, they became less and less important—falling from 34 percent of U.S. consumption to 20 percent.

In the early 1950's, there was a small net import of logs, but this changed rapidly as the export of softwood logs rose. Net exports in recent years have been around 0.5 billion cubic feet a year—roughly 4 percent of U.S. production.

The trend in timber products trade discussed above reflects supply and demand forces operating in the world economy. Especially notable are the growth of population and industrial activity in the United States and other developed countries, and the availability of undeveloped timber resources in Canada and Southeast Asia.

Future trends in U.S. exports and imports of timber products will largely depend on the economic availability of timber in the major forested regions of the world, and on the timber demand-supply-price situation in the major consuming areas. Demand in western Europe and Japan is of particular significance in estimating U.S. export trends. The timber situation in Canada, the source of most U.S. imports, and to a lesser extent in the tropical hardwood areas, is of primary importance in appraising future prospects for imports.

Prospective Trends in World Timber Demands

Although slowed by the recent worldwide recession, consumption of industrial timber products has been growing in all parts of the world. In total, it increased from about 26 billion cubic feet, roundwood equivalent, in 1950 to 49 billion cubic feet in 1977, a rise of nearly 90 percent. Projections prepared by the Food and Agriculture Organization of the United Nations and other organizations point to continued and large increases in demands.[3]

The United States, Europe, and Japan consume over half of the industrial wood produced in the world and are dependent on other regions—Canada, U.S.S.R., and the tropical hardwood regions of Asia, Africa, and Latin America—for nearly one-fifth of this supply (table 4.4, fig. 4.2). This dependency has been increasing in recent years. The studies referred to above indicate that this dependency is likely to continue to increase in the years ahead.

The Situation in Europe. In 1977, the roundwood equivalent of 13 billion cubic feet of timber products was consumed in Europe (excluding the Soviet Union). When fuelwood is excluded, European consumption of industrial wood amounted to 11 billion cubic feet, nearly one-quarter of the world production. Just over half of this volume was utilized in countries belonging to the European Economic Community and another fifth was used in eastern European countries. The remainder of the consumption was nearly evenly divided between Nordic and southern European countries with but small volumes consumed in central Europe.

An assessment of the present and prospective European timber situation was released in 1976 by the Food and Agriculture Organization of the United Nations in cooperation with the United Nations Economic Commission for Europe.[4] This study contains estimates of the supply and demand situation for timber products for the 1949-51, 1959-61, and 1969-71 base periods with projections to the year 2000.

These data show that in terms of roundwood equivalent, lumber (sawnwood) is the most important timber product consumed in Europe although the consumption of wood-based panels —particularly particleboard—and paper and board products has shown the most growth (table 4.5). The consumption of wood-based panels nearly doubled between the 1949-51 and 1969-71 base period, however, in terms of volume, most of the increase in consumption was in pulp products.

By far the largest part of the growth in the consumption of lumber, panel products, and paper and paperboard has been in the European Economic Community. All regions in Europe, however, have shown some increase in the use of these products. For paper and paperboard and panel products, the rise has been particularly rapid in central, southern, and eastern Europe.

Consumption of other timber products such as fuelwood has been de-

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[3] Examples of relevant studies include: Buongiorno, Joseph, and Gerold L. Grosenick. Impact of world economic and demographic growth on forest products consumption and wood requirements. Can. J. Forestry Res. 7(2):392–399. 1977.

Food and Agriculture Organization of the United Nations. Development and forest resources in the Asia and Far East region. Rome. 89 p. 1976.

______. Development and investment in the forestry sector. FO:COFO-78/2, Rome. 21 p. March 1978.

Food and Agriculture Organization of the United Nations—Economic Commission for Europe. European timber trends and prospects 1950 to 2000. Supplement 3 to Vol. XXIX of the Timber Bulletin for Europe, Geneva. 308 p. 1976.

Joint Forestry and Industry Working Party. FAO World Outlook for Timber Supply. Study prepared for the Forestry Department of the Food and Agriculture Organization of the United Nations. Rome. 139 p. and Appendix.

Madas, Andras. World consumption of wood: trends and prognoses. Akademiai Kiado, Budapest, Hungary. 130 p. 1974.

Pringle, S. L. Tropical moist forests in world demand, supply, and trade. Unasylva 28(112–113):106–118. 1976.

[4] Food and Agriculture Organization of the United Nations—Economic Commission for Europe. *Op. cit.*

Table 4.4—*Timber product consumption, net exports, net imports, and production in the world, by country or region, 1977*

(Billion cubic feet, roundwood equivalent)

Country or region	Apparent consumption	Net exports	Net imports	Production
ALL TIMBER PRODUCTS[1]				
United States	13.6	...	1.7	11.9
U.S.S.R.	12.4	1.3	...	13.7
Japan	3.7	...	2.5	1.2
Canada	1.8	3.5	...	5.3
Europe	13.0	...	1.8	11.2
Other	45.7	1.2	...	46.9
Total	90.2	6.0	6.0	90.2
INDUSTRIAL TIMBER PRODUCTS				
United States	13.0	...	1.7	11.3
U.S.S.R.	9.8	1.3	...	11.1
Japan	3.7	...	2.5	1.2
Canada	1.6	3.5	...	5.1
Europe	11.2	...	1.8	9.4
Other	9.8	1.2	...	11.0
Total	49.1	6.0	6.0	49.1

[1]Includes fuelwood and industrial timber products.

Source: United Nations, Food and Agriculture Organization. *Yearbook of forest products, 1977*. Rome, 1979.

clining in Europe and this trend is projected to continue. The decline in consumption of miscellaneous products has been especially rapid in the Nordic countries and the European Economic Community compared with the rest of Europe.

Europe is dependent on other forested countries and regions for an important part of the timber products consumed. In terms of roundwood equivalent, the major imported product is lumber, primarily softwood lumber from the Soviet Union, although Canada and the United States are also important suppliers. Imports from Canada and the U.S. consist of relatively high-quality, high-value softwood lumber.

Over the period 1965 to 1974, Europe improved its trade balance in softwood lumber but this was largely offset by expanded imports of hardwood lumber. The hardwoods were primarily tropical species from West Africa and the Asia-Pacific regions.

The other major group of imported products is wood pulp and paper and paperboard. The bulk of these imports is from North America. A recent development, although still of limited volume, is the introduction of chip exports from southeastern United States to Scandinavian pulp producers.

About two-thirds of the 1974 European imports of timber products (in roundwood equivalent) was from within Europe. The Soviet Union and North America each supplied about 14 percent, the remaining 7 percent was primarily from tropical regions.

With respect to future consumption and trade in Europe, there are two major areas of uncertainty. The period 1973 to 1976 was marked by a worldwide recession unmatched in the postwar era. Although recovery has been underway, there are persistent problems of unemployment, inflation, and monetary instability. Consequently, there are lingering doubts as to the strength and longevity of the next expansionary period in Western Europe.

The second area of uncertainty is the outlook for wood-base panels. Between 1949-51 and 1969-71, the consumption of panels nearly doubled. The major impetus to this growth was the introduction and rapid market acceptance of particleboard. Declining relative prices also encouraged particleboard market penetration. However, plywood and fiberboard also registered large consumption increases. Projections based on these past trends result in estimates of consumption of panel products in 2000 that are approximately 600 percent above the 1969-71 base. It is questionable, however, as to what extent the recent trends, and particularly declining particleboard prices, can be expected to continue in the coming decades.

Despite these uncertainties, the demand for most timber products seems likely to increase substantially by the end of the century. The European Economic Community is expected to continue to account for about half of the consumption of all major products.

In terms of roundwood equivalent, projected European demands in the year 2000 range from 29 to 38 billion cubic feet (table 4.5). This is double the actual consumption in the 1969-71 years and nearly three times that re-

Figure 4.2

Consumption of Industrial Timber Products in the World by Country or Region, 1977

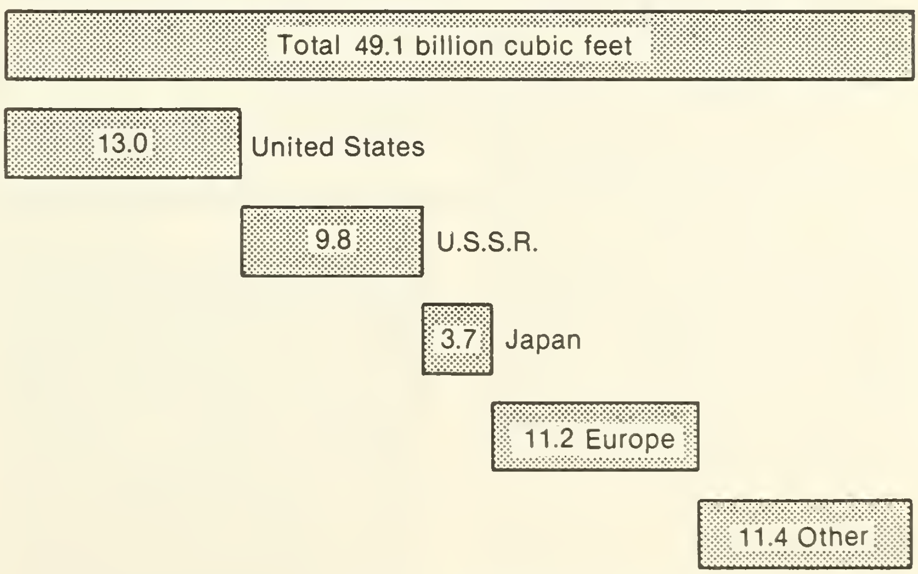


Table 4.5—*Timber product consumption in Europe, by product and geographic area, specified periods 1949–71, with projections to 2000*

(Million cubic feet, equivalent volume of wood in the rough)

Product and area	Average			Projections			
				1990		2000	
	1949–51	1959–61	1969–71	Low	High	Low	High
LUMBER (SAWNWOOD)							
Nordic	425	472	590	600	705	623	845
European Economic Community	1,841	2,325	2,814	2,890	3,351	3,001	3,980
Central	152	181	227	216	251	204	274
Southern	251	338	623	763	944	699	1,014
Eastern	944	1,142	1,176	1,544	1,701	1,870	2,284
Total Europe	3,613	4,458	5,430	6,013	6,952	6,397	8,397
PAPER AND PAPERBOARD							
Nordic	108	192	323	515	682	635	958
European Economic Community	886	1,868	3,196	5,543	7,028	7,075	10,056
Central	48	96	180	287	371	347	503
Southern	48	120	359	1,389	1,868	2,406	3,735
Eastern	168	299	527	1,880	2,215	3,220	4,118
Total Europe	1,258	2,575	4,585	9,614	12,164	13,683	19,370
WOOD-BASED PANELS							
Nordic	36	54	109	344	356	519	556
European Economic Community	109	332	858	2,742	2,869	4,294	4,680
Central	6	24	60	181	193	272	296
Southern	6	24	120	483	568	948	1,159
Eastern	24	85	247	1,039	1,099	1,830	1,963
Total Europe	181	519	1,394	4,789	5,085	7,863	8,654
OTHER WOOD PRODUCTS							
Nordic	1,123	848	466	(1)		(1)	
European Economic Community	1,769	1,285	710	(1)		(1)	
Central	148	138	106	(1)		(1)	
Southern	1,487	1,293	1,254	(1)		(1)	
Eastern	1,127	992	961	(1)		(1)	
Total Europe	5,654	4,556	3,497	2,295		1,942	

[1]Not available.

Note: Areas are defined as follows:
Nordic.—Finland, Iceland, Norway, and Sweden.
European Economic Community.—Belgium-Luxembourg, Denmark, France, Germany (Federated Republic), Ireland, Italy, Netherlands, and United Kingdom.
Central.—Austria and Switzerland.
Southern.—Greece, Portugal, Spain, Turkey, and Yugoslavia.
Eastern.—Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, and Romania.

Source: United Nations, Food and Agriculture Organization and Economic Commission for Europe. *European timber trends and prospects 1950 to 2000.* Timber Bull. for Europe. Supp. 3, vol. XXIX, Geneva, 1976.

corded for the 1959-61 period. The most rapid growth is projected for panel products although in terms of volume the consumption of paper and paperboard also will show large increases. Sawnwood consumption increases only about as rapidly as population growth and the consumption of miscellaneous roundwood and fuelwood continues to decline.

The study indicates that European timber supplies can be increased to partially meet the higher demands. A modest increase of 5 percent is projected in the European forest land area by 2000. Each of the major European regions is expected to share in the expansion although the major changes are projected for Spain because of planned conversion of large areas of unproductive woodland to productive forests. Neither the expansion of forest land nor planned afforestation programs, however, can be expected to have a significant effect on timber supplies before the end of the century.

By the year 2000, growing stock inventories are projected to increase by approximately 55 billion cubic feet, or 11 percent above the 1970 volume, and net annual growth is expected to rise by 19 percent. Annual timber removals (harvest less logging residues) are projected to be around 14.4 billion cubic feet or about 21 percent above those in 1970 (table 4.6).

Projections for all of Europe tend to mask changes in individual countries. Of particular concern is the critical supply situation developing in the Nordic countries,[5] the major source of softwoods for the rest of Europe. In 1970, timber removals were 9 percent above net annual growth in Sweden, the major supplier, and removals are projected to rise to nearly 25 percent above growth by 2000. Should these trends materialize, the resulting reduction in growing stock will have serious repercussions for supply prospects from this region after 2000. Alternatively, efforts to counteract these trends by bringing removals more in line with current net annual growth could result in serious supply shortages well before that date. Recent events in the region, such as the Swedish moratorium on expansion of forest-based industry, suggest that the latter possibility may be more likely.

Part of the anticipated shortfall from the Nordic countries will be met by increased harvest from other European countries, particularly those members of the European Economic Community. However, to attain such increases, the effciency of forest management must be improved. The rising cost of management and the other demands being placed on these forests will tend to counteract these efforts.

In addition to increased roundwood harvest from European forests, improved utilization of the resource can extend supplies. The use of industrial wood residues for pulpwood is projected to grow two to three times by the year 2000. In addition, the recycling of waste paper for paper and paper board is projected to expand at least fourfold. The attainment of such increases will require the cooperation of government, industry, and consumers of forest products.

As a result of the projected rise in roundwood harvests and improvements in utilization of available wood and fiber resources, European wood supplies in the year 2000 are expected to reach 19 to 24 billion cubic feet

[5] Finland, Iceland, Norway, and Sweden.

Table 4.6—*Roundwood removals*[1] *in Europe, by geographic area, 1970 with projections to 2000*

(Million cubic feet inside bark)

Area	1970	Projections 1990	Projections 2000
Nordic	3,948	4,280	4,453
European Economic Community	2,765	3,242	3,595
Central	569	689	752
Southern	2,038	2,391	2,472
Eastern	2,571	2,931	3,136
Total Europe	11,891	13,533	14,408

[1]Removals are defined as timber harvests less logging residues.

Note: Areas are defined as follows:
Nordic.—Finland, Iceland, Norway, and Sweden.
European Economic Community.—Belgium-Luxembourg, Denmark, France, Germany (Federated Republic), Ireland, Italy, Netherlands, and United Kingdom.
Central.—Austria and Switzerland.
Southern.—Greece, Portugal, Spain, Turkey, and Yugoslavia.
Eastern.—Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, and Romania.

Source: United Nations, Food and Agriculture Organization and Economic Commission for Europe. *European timber trends and prospects 1950 to 2000.* Timber Bull. for Europe. Supp. 3, vol. XXIX, Geneva, 1976.

Table 4.7—*Timber product consumption and removals in Europe, by product, specified periods 1949–71, with projections to 2000*

(Billion cubic feet, equivalent volume of wood in the rough)

Item	Average 1949–51	Average 1959–61	Average 1969–71	Projections to 2000 Low	Projections to 2000 High
Consumption of lumber (sawnwood), plywood, and veneer	3.8	4.7	5.9	7.6	10.1
Removals of saw logs and veneer logs	(1)	4.2	5.1	6.1	7.1
Apparent shortfall	(1)	.5	.8	1.5	3.0
Consumption of other industrial timber products and fuelwood	7.2	7.7	9.4	21.7	28.1
Removals of pulpwood, fuelwood, residue transfer, and recycling of waste paper	(1)	7.6	8.7	13.3	17.0
Apparent shortfall	(1)	.1	.7	8.4	11.1
Consumption of all products	11.0	12.4	15.3	29.3	38.2
Total roundwood removals, residue transfer, and recycling of waste paper	(1)	11.8	13.8	19.4	24.1
Total apparent shortfall	(1)	.6	1.5	9.9	14.1

[1]Not available.

Source: United Nations, Food and Agriculture Organization and Economic Commission for Europe. *European timber trends and prospects 1950 to 2000.* Timber Bull. for Europe. Supp. 3, vol. XXIX, Geneva, 1976.

(table 4.7). This is an increase of 41 to 74 percent above the 13.8 billion cubic feet supplied in 1969-71. Only about half of the projected increases in supplies is projected to come from increased removals; the other half comes from improved utilization of available wood and fiber resources.

Although substantial, the projected increases in supplies are not large enough to meet the projected demands for timber products. As a result, timber deficits could reach 14 billion cubic feet, more than one-third of the total demand by 2000 (table 4.7). This potential deficit has important and obvious implications for timber product prices and international trade.

In a free market economy, a situation of this kind can only result in substantial upward movement in prices as they act to bring about an equilibrium between demand and supply. More stringent conservation measures and improved forest management might ameliorate the prospective price increases by raising supplies beyond the projected levels. However, adjusted projections based on the most favorable set of circumstances still indicate a deficit of about 4 to 5 billion cubic feet in 2000, enough to bring about a substantial rise in prices.

As demands rise, European countries will increasingly turn to other regions for timber supplies (table 4.8). Europe is expected to remain fairly self-sufficient in lumber and plywood although more of the hardwood demands will be supplied by imports of finished products rather than as tropical hardwood logs. This will probably mean more European emphasis on supplies from the Asia-Pacific region as opposed to the traditional West African supply region.

European import demands of fiber-based products are projected to about double between 1974 and 2000. Larger imports are expected from all sources with the bulk of the increase coming from North America. This could have important implications for U.S. exports of kraft paper and board products as well as chips.

In 1974, about 86 percent of the European exports were destined for markets within Europe; intra-European shipments are expected to rise to 90 percent of European exports by the year 2000. This implies additional competition among European based suppliers. On the other hand, a leveling-off of supplies from Sweden is projected and this implies less competition from the Nordic countries in the European markets as well as in markets outside Europe. In addition, the gradual eastward shift of industry in the Soviet Union indicates that it might become less of a factor in European markets or at least those in western Europe. These divergent trends will have important implications for the Soviet Union, the tropical hardwood countries, and North America, the traditional outside suppliers of European imports.

In general, the above outlook suggests some expansion of U.S. exports to Europe. It also suggests that the European search for wood and fiber could intensify the competition with U.S. consumers for the available supplies of products such as softwood lumber, newsprint, and hardwood plywood produced in Canada and other timber-exporting forested regions.

The Situation in Japan. Post-World War II industrial expansion in Japan led to expanded demands for raw materials and a several-fold expansion of consumption of timber products to a record high of 4.3 billion cubic feet, roundwood equivalent, in 1973. In response to a cyclical downturn in demand, consumption of timber products declined to 3.4 billion cubic feet in 1975, but has since increased to 3.7 billion cubic feet in 1977 (table 4.9, fig. 4.3).

Japan is heavily forested. However, its timber resources are relatively limited in relation to population. Japanese forests were also severely depleted

Table 4.8—*Timber product imports and exports for Europe, by source or destination and product, 1965 and 1974 with projections to 2000*

(Million cubic feet, equivalent volume of wood in the rough)

Item	1965	1974	Projections to 2000 Low	Projections to 2000 High
IMPORTS FROM NON-EUROPEAN SOURCES				
Logs, lumber, and plywood from—				
U.S.S.R.	494	494	459	530
North America	212	212	247	353
Other	283	388	706	1,059
Total	989	1,094	1,412	1,942
Fiber products from—				
U.S.S.R.	212	459	600	706
North America	388	777	1,342	1,766
Other	71	71	353	530
Total	671	1,307	2,295	3,002
EXPORTS TO NON-EUROPEAN DESTINATIONS				
Logs, lumber, and plywood	113	159	141	176
Fiber products	431	576	565	706
Other	4	4	...	...
Total	548	739	706	882

Source: United Nations, Food and Agriculture Organization and Economic Commission for Europe. *European timber trends and prospects 1950 to 2000*. Timber Bull. for Europe. Supp. 3, vol. XXIX, Geneva, 1976.

in World-War II. As a result of planned reductions in harvest to build up timber inventories and land use changes, production of timber from domestic sources in Japan has gone through a period of decline. This has continued during recent years—output fell from 1.8 billion cubic feet in 1966 to 1.2 billion cubic feet in 1975 (table 4.9, fig. 4.3). This has reflected in part land use changes. Timber from domestic sources fell from 67 percent of Japanese consumption in 1966 to 33 percent in 1977.

The expansion in the consumption of timber products in Japan has been possible through an increase in imports, especially of hardwood and softwood logs, softwood lumber, and wood chips. The imported hardwood logs, nearly all from Malaysia, Indonesia, and the Philippines, are processed into lumber (43 percent) and plywood (57 percent). Most of this hardwood lumber and plywood is used for construction in Japan and for furniture manufacture. In the mid-1970's, Japan relied on imports for about 75 percent of its hardwood requirements.

Softwood logs, imported primarily from the Soviet Union and the United States, are almost all processed into softwood lumber for use in the construction industry in Japan and chiefly in residential construction. In the mid-1970's, Japan relied on imported softwood logs for about 50 percent of its softwood roundwood needs.

Lumber imports currently amount to the equivalent of about 10 percent of the volume of imported logs. These imports, primarily softwoods from Canada and the United States, amounted to about 6 percent of Japan's lumber consumption in the mid-1970's. The imported lumber, especially softwoods, competes directly with lumber processed from imported and domestically produced logs.

The primary sources of imported wood chips used for pulp are the United States, New Zealand, and Australia. Japan has also developed sources in Southeast Asia, Canada, South America, and South Africa. In total, chip imports amount to about 43 percent of the wood consumed in the pulp industry in Japan.

The primary sources of wood pulp imports are the United States, Canada, and New Zealand. Although wood pulp imports still amount to only 12 percent of consumption in Japan, recent upward valuations of the Japanese yen relative to other currencies have given imports a competitive edge in the Japanese market. If recent currency relationships continue, pulp imports will probably grow in importance as a source of supply. Joint-venture pulpmills between Japanese investors and investors in various forested countries would probably become more important under these conditions.

The United States, Canada, and western Europe are the primary sources of imported paper and board products. Although these imports are relatively small—less than 5 percent of Japanese consumption—recent increases in imports have come at a time of excess capacity in Japan's domestic industry. This has heightened concern about the effects of imports on domestic producers. As is the case for pulp, paper and board imports have increased primarily because of the devaluation of the dollar relative to the Japanese yen.

Japan recycles about 40 percent of its consumption of paper and board. This is one of the highest rates of recycling in the world. Further increases in the rate of recycling are possible, of course, but it is doubtful whether this rate can be increased much beyond current levels.

The most recent projections of the Japanese Forestry Agency[6] indicate that the demand for timber products might reach 5.3 billion cubic feet in 1996 and 5.4 billion cubic feet in 2026 (table 4.10). The projected growth in demand of 28 percent between 1976 and 1996 is somewhat lower than for previous projections, in part because overall economic growth is expected to be lower in the future than in previous projections. Some growth in demand is expected for all major end products, with pulp accounting for the largest part of the total increase. The projections of demand for plywood include an allowance for increased use of particleboard and other fiberboards. Some substitution of fiber for solid panels is expected in light of uncertainties over availability of tropical hardwoods from Southeast Asia.

Supply from domestic Japanese sources is expected to increase, especially in the 1990's and later decades. The proportion of supply that is expected to be imported declines as supply from domestic sources increases. Despite some increase in supply from domestic sources, however, the projections indicate that Japan will still have

[6] Japan Ministry of Agriculture and Forestry. Revised basic plan for forest resources and revised long-term forecast on demand and supply of important forest products. Japan Lumber Journal 21(11):1–7. 1980.

to import the equivalent of nearly 3 billion cubic feet of timber in 1996 and 2 billion in 2026. Some increase in consumption of mill residue is expected in the manufacture of pulp and fiber-based panels.

Projections of demands and supplies in Japan are based on a set of assumptions about the sequence of events necessary to bring forth the anticipated increase in harvest from domestic sources. For example, market structures will have to shift from the importation of logs and distribution of lumber from coastal areas to the processing and distribution of lumber and other products from locations in the interior of the country. Even with expanded domestic supplies, Japan will continue to be one of the world's primary deficit areas in timber products. It seems clear that Japan will continue to look to North America, Siberia, and Southeast Asia as sources of timber into the next century.

There are several factors which will affect the level and pattern of future timber products trade between Japan and the United States. The rapid growth of U.S. exports of softwood logs and chips to Japan in the 1960's and early 1970's was based on a unique set of circumstances not likely to continue in the future. During this period, Japan moved from a country recovering from the effects of a war to a country having a maturing, industrialized economy. Sustained growth of this economy will tend to depend more on the growth in domestic rather than export demand, the reverse of the pattern for the past two decades. Future growth in domestic demand will likely be slower than growth since the war and will follow a cyclical pattern similar to those in the U.S. and western European countries. Thus, in the future, changes in Japanese demands for imported timber products from the United States are more likely to be dependent on changes in the availability of supplies from competing sources than on shifts in demand, as the following discussion indicates.

Future softwood log and lumber exports from the United States to Japan will depend in part on the level of Japanese housing starts and technical developments in housing construction. During the past decade, housing starts in Japan have generally ranged between 1.5 and 1.7 million per year—about four times the average in the early 1960's. On a per capita basis,

Table 4.9—*Timber product consumption in Japan, by source of supply and product, 1975, 1976, and 1977*

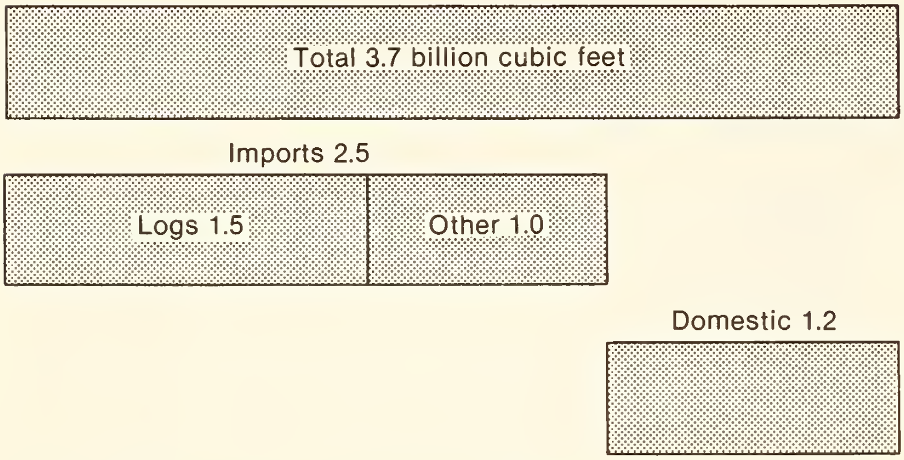
(Million cubic feet, roundwood equivalent)

Item	1975	1976	1977
DOMESTIC SUPPLY	1,221.1	1,262.8	1,246.6
FOREIGN SUPPLY			
Logs			
Softwoods			
United States	367.2	395.8	372.0
U.S.S.R.	272.3	289.6	274.3
New Zealand	17.9	31.6	30.8
Canada	6.4	9.8	15.8
Other	17.1	14.7	17.5
Total	680.9	741.5	710.4
Hardwoods			
Malaysia	240.2	369.2	349.0
Indonesia	258.5	341.1	338.3
Philippines	110.6	68.6	59.9
Other	19.3	21.9	23.2
Total	628.6	800.8	770.4
Mixed species	3.6	5.9	6.5
Total	1,313.1	1,548.2	1,487.3
Lumber			
Softwoods			
Canada	71.3	104.6	119.4
United States	78.3	78.2	69.6
U.S.S.R.	7.4	8.0	8.3
Other	16.3	32.8	33.8
Total	173.3	223.6	231.1
Hardwoods			
Asia	13.0	13.3	24.8
Other	1.3	.1	1.2
Total	14.3	13.4	26.0
Total	187.6	237.0	257.1
Wood chips and pulpwood			
United States	232.0	234.0	229.1
Australia	77.0	92.2	111.7
U.S.S.R.	11.4	36.5	52.1
New Zealand	10.6	9.3	14.3
Asia	39.1	30.5	28.5
Other	1.3	10.0	16.5
Total	371.4	412.5	452.2
Woodpulp			
United States	65.7	64.2	69.7
Canada	70.8	75.6	68.7
New Zealand	24.7	27.0	37.7
Western Europe	2.1	1.7	6.6
Other	3.0	4.8	4.7
Total	166.3	173.3	187.4
Paper and board			
United States	7.7	7.2	10.5
Canada	2.8	5.6	6.4
Western Europe	4.8	6.7	8.4
Asia	2.7	.4	.3
Other	.1	.1	.1
Total	18.1	20.0	25.7
Other products	94.0	91.3	92.4
Total foreign supply	2,150.5	2,482.3	2,502.1
Total supply	3,371.6	3,745.1	3,748.7

Sources: Derived from data published by Japan Forestry Agency. *Timber demand and supply for 1977-78.* Japan Lumber Journal 19(8). 1978; and Ministry of Finance, Japan Tariff Association. *Japan exports and imports by country.* Tokyo, December 1975, 1976, and 1977.

Figure 4.3

Consumption of Timber Products in Japan by Source, 1977



current construction is about twice the rate of construction in the United States. It reflects Japanese programs to upgrade the housing inventory. A large part of the units built, as much as two-thirds in recent years, have been replacements for existing units. This high replacement rate cannot be continued for long and it seems likely that there will be a substantial fall-off fairly early in the projection period. A development of this kind would, of course, reduce demands for imported softwood logs and lumber.

North American softwood lumber and softwood plywood exports to Japan could be significantly affected if the North American technique (platform frame construction) of building houses—now being promoted in Japan by Canadian and U.S. producers—is more widely adopted. This would create a demand for softwood dimension lumber and softwood plywood of the sizes and qualities manufactured in North America. The existing distribution system in Japan, however, is geared to domestic processing of logs. An alternative Japanese response to expanded use of the platform frame construction technique would be to continue the importation of logs with domestic processing of the lumber sizes needed.

In any event, any expansion of Japanese imports of softwood lumber would probably be at the expense of softwood log imports. Under current exchange rates, Canada would be in a strong position to capture any increased Japanese market for imported softwood lumber.

Developments in other countries, and especially in the U.S.S.R., will also affect the level of softwood log and lumber exports to Japan. When the Baykal-Amur railway presently under construction is finished, probably in the mid-1980's, additional inventories of softwood timber will become more accessible in Siberia. If government priorities lead to construction of the necessary infrastructure, expanded log exports to Japan could be one of the results of the completion of the railroad. Other developments, such as pulp manufacture, could receive priority, however.

Other forces will also affect the future levels of trade in softwood logs and lumber. For example, recent events in Japan suggest that domestic timber producers are lobbying for controls on the volume of softwood construction material imported from North America. In addition, there are continuing pressures in the United States to increase the export of lumber and other finished products at the expense of logs.

Future chip and pulp exports from the United States to Japan will tend to depend on the course of economic growth in Japan and the availability of supplies from other sources. As indicated above, maturity in the Japanese economy points to a slow down in economic growth. In addition, environmental pressure in Japan might force a portion of any increase in consumption of fiber-based products to be based primarily on the importation of wood pulp rather than chips.

In the 1970's, chips went from the status of a shortage commodity to one in surplus in world markets, but with pronounced cycles in prices in 1974-75 and 1979-80. Many regions of the world, such as Southeast Asia, Central and South America, and Siberia have the potential to produce large volumes of chips for export. The availability of chips from such sources, the need to absorb at least some tropical hardwood pulp, and the probable effects of environmental pressures in Japan will tend to hold down or reduce U.S. chip exports to Japan. Continuing demand is expected, however, for at least some long-fibered softwood chips.

Japanese demand for imported woodpulp is expected to grow fairly fast in the future. The U.S. share of this market will depend on develop-

Table 4.10—*Timber product demand and supply in Japan, 1966, 1971, and 1976, with projections to 2026*

(Million cubic feet, roundwood equivalent)

Item	1966	1971	1976	Projections		
				1986	1996	2026
Demand						
Lumber	1,991.5	2,363.0	2,268.1	2,473.6	2,584.2	(1)
Pulp	727.1	1,015.5	1,169.6	1,426.5	1,774.2	(1)
Plywood	248.9	529.5	505.8	588.8	695.5	(1)
Other	154.1	98.8	181.8	189.7	209.4	(1)
Total	3,121.6	4,006.8	4,125.3	4,678.6	5,263.3	5,449.0
Supply						
Imports	1,014.5	2,187.7	2,615.4	2,853.9	2,984.3	1,961.6
Domestic	2,107.1	1,819.1	1,509.9	1,824.7	2,279.0	3,487.4
Mill residues	169.5	257.8	268.4	353.1	381.3	(1)
Total	3,121.6	4,006.8	4,125.3	4,678.6	5,263.3	5,449.0

[1]Not available.

Source: Japan Ministry of Agriculture and Forestry. *Revised basic plan for forest resources and revised long-term forecast on demand and supply of important forest products.* Japan Lumber Journal 21(11):1-7. 1980.

ments in Canada, the Soviet Union, and tropical areas—the primary sources of potential competition for the Japanese pulp market. Over time, pulp production in British Columbia may increase in response to the availability of wood fiber. Production of pulp in Siberia for export to Japan might be one of the results of completion of the Baykal-Amur railroad. By the turn of the century, market pulp from the tropical areas—new mills based on hardwoods are now planned in South America, Africa, and Southeast Asia—will be a more important factor in world markets. In all likelihood, however, there will be continuing and probably increasing Japanese demand for softwood pulp produced in the United States.

Paper and paperboard exports to Japan from the United States did not become significant until the mid-1970's. The rapid expansion of U.S. sales from about 15,000 tons in 1970 to over 100,000 tons in 1976 was based primarily on increased imports of paperboard and reflects a change in the competitive position of Japanese producers vis-a-vis U.S. producers. Whether or not the current world market situation for chips, pulp, and paperboard will change to again give Japanese producers a competitive edge in paper and paperboard manufacture is not clear. If, as seems to be the case, the Japanese population continues to adapt to a western lifestyle, paper and paperboard demand will continue to grow, offering the potential of increased exports from the United States.

Softwood plywood exports from the United States to Japan have never exceeded 10 million square feet per year. Widespread adoption of the platform frame construction technique in Japan could increase the potential for softwood plywood exports. Consumer familiarity and the cost advantage of hardwood plywood, however, will tend to inhibit U.S. sales of softwood plywood to Japan.

Although restrictions on log exports in Southeast Asia may force Japan to buy lumber, plywood, and other processed products, hardwood supplies appear adequate, at least for the next two decades or so. Beyond that time, supplies from existing inventories of preferred tropical species become uncertain.

In summary, the outlook in Japan suggests a decline in the demand for softwood logs and chips. The demand for softwood lumber, and to a lesser extent for softwood plywood, may also be reduced, although the demand for these products will depend in large part on the techniques used in housing construction. A growing demand is expected for softwood pulp and possibly for paperboard. In total, however, and because of the prospective timber supply situation, it seems likely that Japan will continue to depend on other forested countries, the Soviet Union, Canada, Southeast Asia, and the United States for a large part of its supply of most timber products.

In the future, Japanese imports of timber products from the United States will probably continue to originate on the Pacific Coast, especially in the States of Alaska, Washington, and Oregon. Pending changes in commercial timberland use and ownership and in timber supplies in this area are likely to have major impacts on the future trends in exports.

Most of the timber industry in Alaska is located in Southeast Alaska and is dependent on timber from the Tongass National Forest. At the present, there are two pulp mills and several sawmills. All of the output from one of pulp mills and the output of the sawmills are exported to Japan. As the result of a settlement of conflicting claims, Alaskan Native corporations will soon own susbtantial acreages of timberland in Southeast Alaska as well as in the interior. Changes in land-use classification on the remainder of the Tongass National Forest may limit the potential of further expansion of exports based on timber from this source. Timber sales policies on the timberlands owned by Alaskan Native corporations are not clear,[7] but at least one Alaskan Native corporation has signed a contract for the export of logs to Japan and others are considering this option.

In Washington and Oregon, much of the old-growth timber inventory on industry lands, and on lands managed by the State of Washington Department of Natural Resources in western Washington, will have been harvested by the 1990's. Because of log export restrictions on Federal and other public lands, these industry and Washington State lands are currently the sources of nearly all logs going into the export market.[8] In addition, the old-growth timber from these lands probably accounts for a major share of the clear lumber which is exported worldwide.

A decline in the availability of high-quality timber, which will occur as these old-growth stands are cut, will tend to adversely affect the current U.S. comparative advantage in the export of softwood logs and lumber. For example, at the present time, it is not clear whether the Japanese would be willing to purchase second-growth sawlogs in the same quantities that they now purchase primarily old-growth. Instead of continuing to purchase U.S. sawlogs, Japanese importers might expand imports of Canadian softwood lumber and of softwood sawlogs and/or lumber from the Soviet Union. Softwoods from Japanese domestic sources might also assume higher importance as a source of supply.

Any expansion of pulp mill capacity in Washington and Oregon in the foreseeable future will probably be at existing sites. The availability of water and environmental considerations constrain the feasibility of "green-field" mills. While expansion at existing sites might result in significant additions of capacity over time, the constraints on expansion will limit the responsiveness of U.S. exports to growing Japanese demands unless sales in other markets are reduced.

Although producers in Oregon and Washington tend to be more oriented to export sales than is the case of U.S. firms in general, the domestic rather than export market is the major source of demand for timber products. Cycles in both domestic and foreign markets tend to reinforce the domestic orientation of U.S. producers. This suggests that most of the impact of the declining availability of timber supplies in the Pacific Northwest will be on export rather than domestic sales.

The Situation in Other Countries and Regions. Although most of the U.S. export trade in timber products has been with Europe and Japan, there have been significant exports of woodpulp, paper and board, lumber, logs, veneer, and plywood to other countries. For example, there has been significant growth in softwood lumber and paper and board exports to Canada, and paper and board exports to Central and South America. Trade in other timber products and trade with other regions

[7] For additional information, see Darr, David, Ronald Glass, Thomas Ellis, and Donald Schmiege. An overview of some economic options for Southeast Alaskan timber. Pacific Northwest Forest and Range Exp. Sta., Portland, Oreg. 1977.

[8] Lindell, Gary R. Log export restrictions of the western States and British Columbia. U.S. Dep. Agric., Forest Serv., Gen. Tech. Rep. PNW-63, Pacific Northwest Forest and Range Exp. Sta., Portland, Oreg., 14 p., illus. 1978.

are important, but exports have been stable or showing only slow growth over the 1960's and 1970's.

In general, demands for timber products are expected to grow in these areas, much as in the United States, Europe, and Japan. However, many of these areas have substantial forest resources. These resources along with the development of domestic timber processing facilities are likely to significantly affect the levels of U.S. exports. Numerous announcements of plans for pulp and other types of timber processing complexes for countries in Asia, Africa, and South America generally have reduced imports as one of the goals of development. If and when these plans come to fruition, they will have a significant major impact on world trade in timber products, especially hardwood logs, lumber, plywood, pulp and paper and board. In general, they would reduce export demand for U.S. timber products, and particularly that for pulp, paper, and board.

World Forest Land and Timber Resources

Future trends in U.S. trade in timber products will be influenced by the trends in demands in the major consuming areas discussed above. They will also be influenced by the supplies of timber in the timber producing regions of the world.

Any analysis of potential supplies of timber on a global basis should be based on a detailed examination of the extent and status of timber resources. Unfortunately, such information is largely lacking; only one-third of the world's forests has been covered by any form of inventory. Even for those areas inventoried, there are differences in definitions and standards which impede the compilation of comparable data. Despite the limitations, it is apparent that there are large inventories of timber in some regions of the world and that timber harvests can be increased above present levels.

Only one-third of the world's forests have been inventoried. Nonetheless, it is clear that there are large volumes of timber in some regions, and that timber harvests can be increased above recent levels.

Forest Areas. Closed forests cover approximately 7.5 billion acres or roughly 23 percent of the world land area (table 4.11). About 60 percent of the closed forest supports hardwoods; the remainder consists of softwood species.

Closed forests include only those forest lands with 20 percent or more tree crown cover; they exclude large areas of ill-defined, open woodland and scrub brushlands which are found in many regions, particularly in Africa and South America. Although often of great importance to local people as a source of fuelwood, these open areas are not likely to be a significant source of supply for the industrial timber products in demand in the major developed countries.

Although forests cover a large portion of the earth's surface, it is apparent that these resources are not evenly distributed (fig. 4.4). The Soviet Union contains over one-quarter of the world's closed forest land and another one-quarter is located in Latin America. The Nordic countries are relatively well endowed whereas some regions which are commonly thought to be heavily forested, such as Africa, actually contain modest resources when related to the total land area or the size of the population. From a global perspective, there are about 2 acres of forest land per capita; this ranges from less than 0.1 acre in the Near East to over 7 acres in the Nordic region and the Soviet Union.

Timber Volumes. The closed forests of the world contain approximately 10 trillion cubic feet of growing stock (table 4.12). An additional 1.3 trillion cubic feet is found outside of the closed forest in open woodlands, primarily in Africa.

About one-third of the growing stock volume in the world is composed of softwoods and over half of this is in the Soviet Union (fig. 4.5). An additional one-quarter of the world's softwood timber is located in North American forests.

Hardwoods compose nearly two-thirds of the world's growing stock; most of this timber is found in the tropical and subtropical regions (fig. 4.6). Nearly half of the hardwood timber is located in Latin America. Temperate hardwoods are widely scattered throughout the world including Europe and North America but comprise only 18 percent of the hardwood growing stock. The remaining hardwood timber inventories are in the tropical forests of the Asia-Pacific region and Africa.

Timber Harvests. The world roundwood harvest totaled an estimated 88.4 billion cubic feet in 1973; softwoods composed 45 percent of this harvest and hardwoods the remaining 55 percent (table 4.13).

Forests of North America and the U.S.S.R., supplied nearly 25 billion

Table 4.11—*Land and closed forest areas of the world, by region or country, 1973*

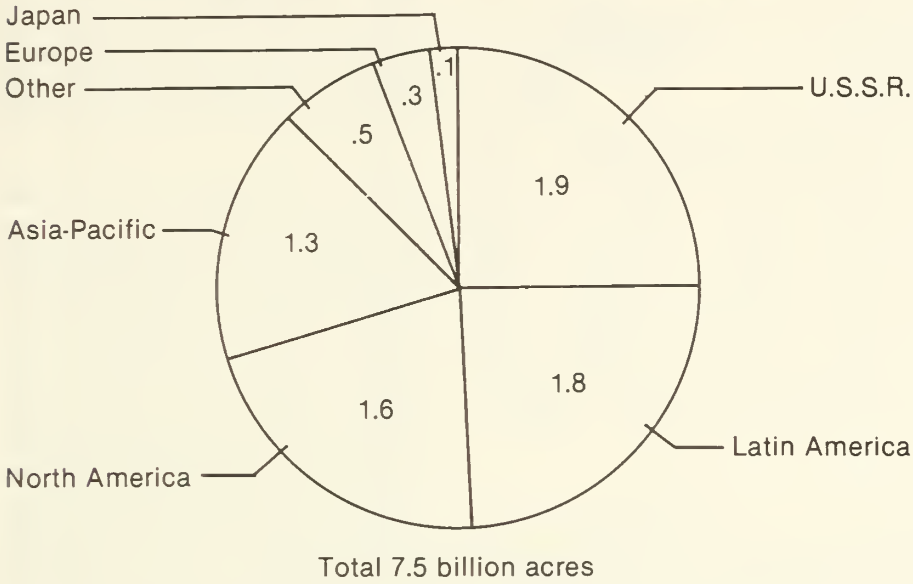
Region or country	Total land area	Closed forest land[1]		
		Area	Proportion of total land area	Per capita area
	Million acres	*Million acres*	*Percent*	*Acres*
North America	4,549	1,559	34	6.7
Latin America	5,088	1,791	35	5.9
Nordic[2]	278	127	46	7.4
Europe (except Nordic)	1,078	229	21	.5
Near East	1,476	8	1	.1
Africa	7,487	469	6	1.2
Asia-Pacific (except Japan)	7,104	1,265	18	.7
Japan	93	62	67	.5
U.S.S.R.	5,289	1,940	37	7.7
Total	32,442	7,450	23	2.0

[1]Forest land with 20 percent or more tree crown cover.
[2]Finland, Iceland, Norway, and Sweden.

Sources: United Nations, Food and Agriculture Organization and Economic Commission for Europe, *European timber trends and prospects 1950 to 2000.* Timber Bull. for Europe. Supp. 3, vol. XXIX, Geneva, 1976 Reidar Persson. *World forest resources.* Rapporter och Uppsatser, Nr. 17, Royal College of Forestry, Stockholm, 1974.

Figure 4.4

Closed Forests of the World by Country or Region, 1973



cubic feet of softwood roundwood, about three-fifths of the world softwood supplies. Practically all of the softwood harvest was used for the manufacture of structural materials and other industrial items including pulp products.

Harvests of hardwoods amounted to about 49 billion cubic feet in 1973. Industrial logs composed only 30 percent of this volume—the rest was used as fuel, primarily in the tropical regions. In some tropical regions, as much as 90 percent of the hardwood harvest is utilized as fuelwood primarily for domestic cooking. Latin America, with its vast hardwood resources, supplies less than 10 percent of the world harvest of industrial hardwood logs. Contrary to the situation in the tropical areas, the bulk of the harvest of temperate hardwoods is used for industrial purposes.

Timber Supply Potential. The above data show that several regions are relatively well endowed with forest land and growing stock and yet are producing but a small percentage of world timber supplies. Similarly, several regions supply relatively large amounts of timber from a limited timber inventory.

This difference in intensity of use is illustrated in table 4.13 which relates timber harvest to volume of growing stock for major regions. It is apparent that the softwood growing stock is more intensively utilized although the intensity of use varies considerably among regions. From a global perspective, annual softwood harvest represents only 1.1 percent of the growing stock whereas forests in several of the developed regions, such as Europe and Japan, support harvests over twice this rate.[9] On the other hand, softwood forests of the Soviet Union are supporting an annual harvest of only 0.5 percent of the growing stock.

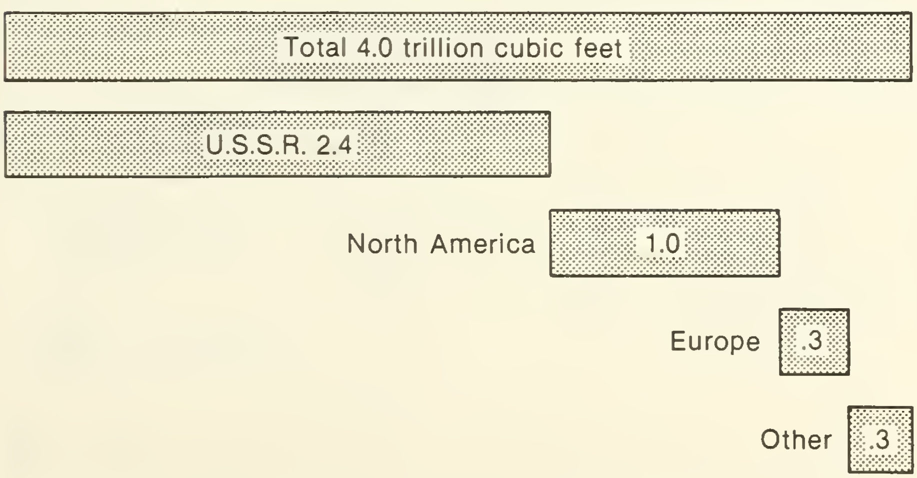
The world's hardwood forests exhibit similar variation among regions. Tropical hardwood forests are but lightly utilized. Forests of Latin America, for example, support an annual rate of harvest of only 0.3 percent of the growing stock and practically all of that is used for fuelwood. Harvest rates for the Asia-Pacific region are higher but again only a small proportion is intended for industrial purposes.

Contrary to the situation in the tropics, temperate hardwood forests are generally heavily utilized. Harvest rates in Europe and Japan average 2 percent of the growing stock and in North America 1.1 percent. But these high rates are outweighed by the large areas of lightly used tropical forests. From a global perspective, hardwood harvests average only 0.7 percent of the growing stock and the industrial harvest is only 0.2 percent.

The relatively low rates of utilization in some regions suggest that there is a potential for increased supplies from both softwood and hardwood forests. In general, however, the underutilized forests are in areas inaccessible to common forms of land and water transportation. As shown below, improvements in accessibility and the development of the necessary infrastructure for the use of these forests will require time and large capital investments.

Figure 4.5

Softwood Growing Stock of the World by Country or Region, 1973



[9] The large rate shown for Africa is developed from very low volumes of growing stock and may be highly exaggerated. Industrial plantations in certain areas such as South Africa and Swaziland are being managed very intensively however.

Table 4.12—*Timber growing stock of the world, by softwoods and hardwoods and region or country, 1973*

(Billion cubic feet)

Region or country	Closed forests[1] and open woodlands				Closed forests[1]			
			Hardwoods				Hardwoods	
	All species	Soft-woods	Tem-perate	Trop-ical	All species	Soft-woods	Tem-perate	Trop-ical
North America	1,288	953	335	(2)	1,288	953	335	(2)
Latin America	3,260	92	166	3,002	2,981	92	134	2,755
Europe	526	335	191	(2)	526	335	191	(2)
Africa[3]	2,134	4	11	2,119	1,494	4	7	1,483
Asia-Pacific (except Japan)	1,330	201	176	953	1,208	201	124	883
Japan	71	39	32	(2)	71	39	32	(2)
U.S.S.R.	2,790	2,366	424	(2)	2,578	2,154	424	(2)
Total	11,399	3,990	1,335	6,074	10,146	3,778	1,247	5,121

[1]Forest land with 20 percent or more tree crown cover.
[2]Not represented in region.
[3]Includes the Near East.

Source: Adapted from S. L. Pringle, *Tropical moist forests in world demand, supply and trade.* Unasylva 28 (112–113): 106–118. Rome, 1976.

Prospective Trends in Timber Supplies from Canada

The timber resources of Canada are of special significance to the United States for both geographic and economic ties make Canada a primary source of timber supply. Canada is the leading timber exporting Nation in the world; about three-fourths of the exports go to the United States.

Forest Land Area. In 1976, there was 490 million acres of productive forest land in Canada, i.e., forest land capable of producing a merchantable stand within a reasonable length of time and whose primary purpose is for timber production (table 4.14). Of these productive lands, some 88 percent is classed as currently productive (stocked land that is in any stage of maturity) and the remainder is potentially productive (capable of producing a merchantable stand within a reasonable length of time, but presently depleted).

In 1976, over nine-tenths of the productive forest land, some 453 million acres, was publicly owned, chiefly by the Provinces. About two-thirds of these lands were located in British Columbia, Ontario, and Quebec (fig. 4.7). Nearly all of the remainder were in the Prairie and Atlantic Provinces. Nearly all of the 38 million acres of the productive forest land in private ownership was in Ontario, Quebec, and the Atlantic Provinces.

In addition to the productive forest land, there was 235 million acres of forest land that was classified unproductive, i.e., incapable of producing a merchantable stand within a reasonable length of time. Nearly all of this land was in public ownership. Most of it was located in the Prairie and Atlantic Provinces and the Northwest and Yukon territories.

There was another 24 million acres of forest land that was classed as reserved. These lands, used for parks, game refuges, and other purposes not compatible with timber production, are by law not available for growing and harvesting of forest crops. The bulk of these lands are in British Columbia, the Prairie Provinces, and the Northwest and Yukon Territories.

Timber Inventories. There was a timber inventory of 537 billion cubic feet of softwoods in the productive forest lands in Canada in 1976 (table 4.15). This is about 18 percent more than softwood inventories on commercial timberlands in the United States. There was an additional 145 million cubic feet of hardwoods, 43 percent less than in the United States. About half of the total softwood inventory in Canada was in British Columbia (fig. 4.8). Ontario and Quebec were the next most important Provinces in terms of softwood inventory. Ontario, Quebec, and the Prairie Provinces had most of the hardwood timber inventory in 1976.

Some 92 percent of the timber inventory in Canada was on public lands. The dominance of public ownership in Canada could become especially important as policies are implemented to intensify forest management over the coming decades.

Figure 4.6

Hardwood Growing Stock of the World by Country or Region, 1973

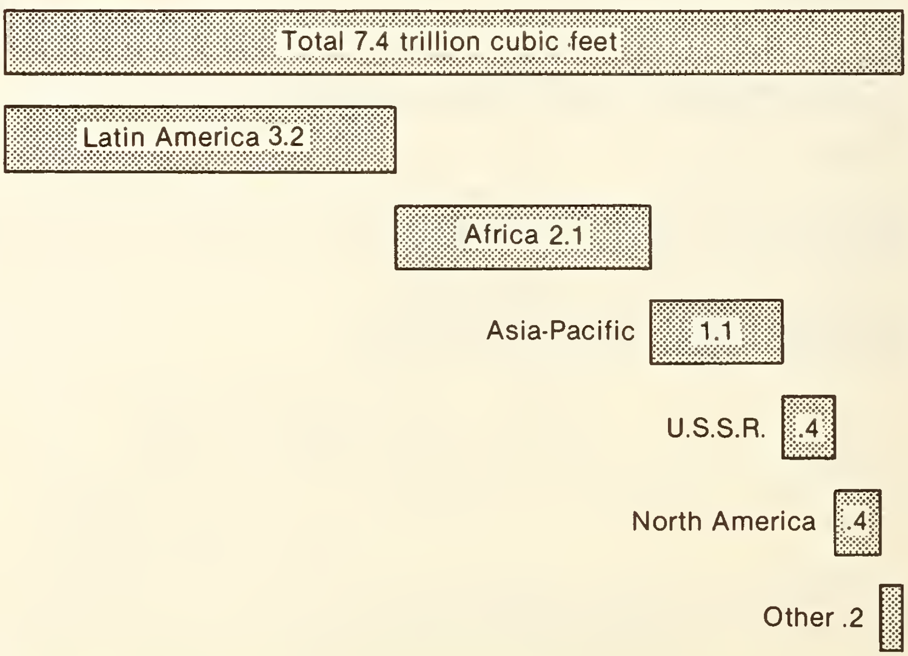


Table 4.13—*Harvest of roundwood and industrial roundwood in relation to growing stock in the world, by softwoods and hardwoods and region and country, 1973*

Region or country	Total roundwood harvest[1]				Industrial roundwood harvest			
	Softwoods		Hardwoods		Softwoods		Hardwoods	
	Total	Proportion of softwood growing stock	Total	Proportion of hardwood growing stock	Total	Proportion of softwood growing stock	Total	Proportion of hardwood growing stock
	Billion cubic feet	*Percent*	*Billion cubic feet*	*Percent*	*Billion cubic feet*	*Percent*	*Billion cubic feet*	*Percent*
North America	13.4	1.6	3.5	1.1	13.3	1.6	3.0	0.9
Latin America	1.6	2.0	8.1	.3	.8	1.0	1.1	[2]
Europe	7.5	2.5	3.8	2.0	7.1	2.3	2.5	1.3
Africa[3]	.4	13.3	10.6	.5	.2	7.8	1.3	.1
Asia-Pacific (except Japan)	4.5	2.5	19.9	1.9	1.8	1.0	4.5	.4
Japan	.9	2.5	.6	2.0	.9	2.5	.6	1.9
U.S.S.R.	11.3	.5	2.3	.5	9.3	.4	1.2	.3
Total	39.6	1.1	48.8	.7	33.4	.9	14.2	.2

[1]Includes fuelwood and industrial timber products.
[2]Less than .05.
[3]Includes the Near East.

Source: Adapted from S. L. Pringle. *Tropical moist forests in world demand, supply and trade.* Unasylva 28 (112–113): 106–118. Rome, 1976.

Figure 4.7

Forest Land Area in Canada by Province, 1976

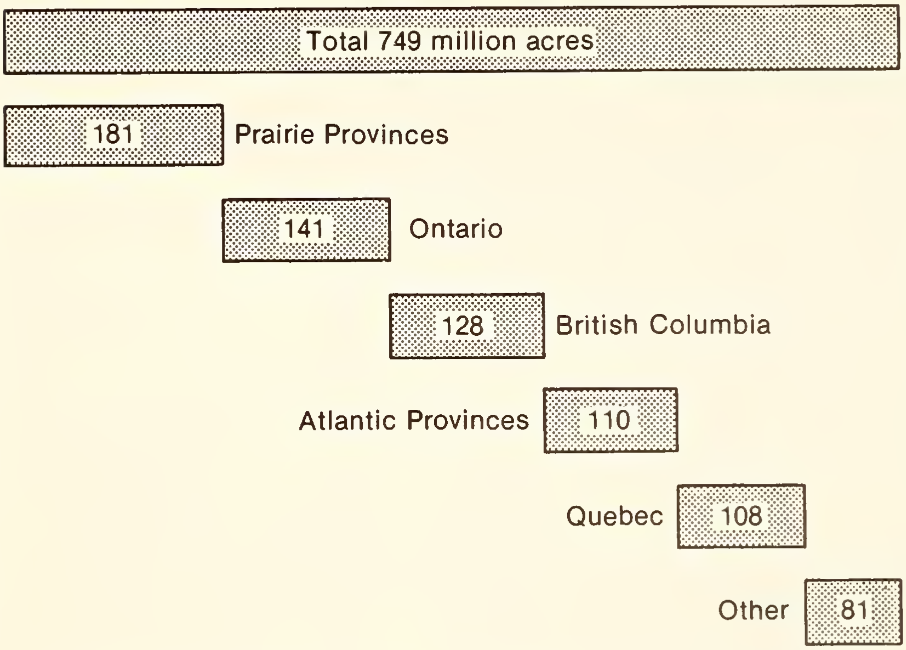
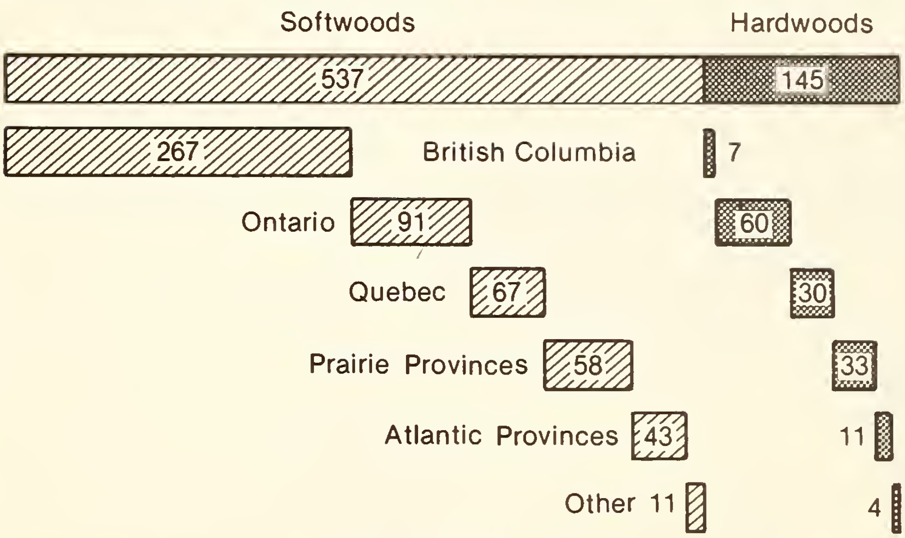


Figure 4.8

Merchantable Timber in Canada by Province, 1976

Billion cubic feet



Production Trends. Output of all major industrial timber products except hardwood lumber in Canada has climbed steadily in recent decades (table 4.16). For most products—wood pulp, paper and board, and plywood and veneer—the largest part of the increase took place before 1970. However, the production of softwood lumber, which accounts for 95 percent of the Canadian output, continued to show rapid growth, moving up from 11.3 billion board feet in 1970 to 19.0 billion board feet in 1978 and 1979.

Most of the increase in softwood lumber production since World War II has been in British Columbia. In the early 1950's, annual output in that Province was less than 4 billion board feet—about 54 percent of Canadian production. By the late 1970's, British Columbia was producing 12.5 billion board feet of softwood lumber per year—about two-thirds of the Canadian cut. Development of the interior of British Columbia in the 1960's and 1970's was an especially important factor in the increased production. Production in the interior of the Province in recent years has averaged 7.9 billion board feet compared with 1 billion board feet in 1950.

Quebec and Ontario are the next most important Provinces in Canada in terms of softwood lumber production, together accounting for 3.0 to 3.5 billion board feet annually in recent years. This is over double production of the early 1950's. Softwood lumber output in the Prairie Provinces has also grown over the past three decades and amounts to about 500 million board feet. Production in the Atlantic Provinces has been relatively stable, and there is limited potential for expansion.

In contrast to the rapid growth of softwood lumber production, the output of hardwood lumber in Canada has fluctuated around a level of 500 million board feet.

Softwood plywood production rose rapidly during the 1950's and early 1960's. Over the past 15 years, however, output has varied between 2.5 and 3.5 billion square feet with no apparent growth trend. This lack of growth reflects in part tariff and other trade barriers which have constrained exports to the United States. British Columbia accounts for over 85 percent of the softwood plywood produced in Canada. Within British Columbia, about half of the industry capacity is located in the coastal area and half in the interior.

Between 1950 and 1974, wood pulp production in Canada increased from about 8.5 million tons to a peak of nearly 22 million tons—a volume that was maintained without much change through 1979. Mills in Quebec and Ontario account for about half of the Canadian production and those in British Columbia most of the remainder. Most of the increase in production in the 1960's and early 1970's was in that Province and the Prairie and Atlantic Provinces.

Paper and board production in Canada in 1979 was 14.9 million tons—somewhat more than double the 6.8 million tons produced in 1950. Newsprint accounted for about two-thirds of the output in 1979, down

Table 4.14—*Forest land*[1] *area in Canada by class, ownership, and Province or Territory, 1976*

(Million acres)

Ownership, Province, or Territory	Total	Available[2]						Reserved[3]
		Total	Productive[4]			Unproductive[5]		
			Total	Currently[6]	Potentially[7]			
Public								
Atlantic Provinces[8]	91.7	90.4	28.6	25.7	2.9	61.8		1.3
Quebec	98.0	97.8	83.4	75.8	7.6	14.4		.2
Ontario	128.8	128.8	95.9	88.2	7.7	32.9		(10)
Prairie Provinces[9]	180.0	170.6	102.6	81.8	20.8	68.0		9.4
British Columbia	122.0	117.6	117.6	107.2	10.4	0		4.4
Northwest and Yukon Territories	80.6	77.6	24.7	19.0	5.7	52.9		3.0
Total	701.1	682.8	452.8	397.7	55.1	230.0		18.3
Private								
Atlantic Provinces[8]	18.5	18.3	16.8	14.3	2.5	1.5		.2
Quebec	9.4	9.4	8.7	7.7	1.0	.7		0
Ontario	12.1	12.1	10.4	9.9	.5	1.7		0
Prairie Provinces[9]	1.2	1.2	.5	.5	(10)	.7		0
British Columbia	6.4	1.2	1.2	1.0	.2	0		5.2
Northwest and Yukon Territories	(10)	(10)	(10)	(10)	(10)	(10)		(10)
Total	47.6	42.2	37.6	33.4	4.2	4.6		5.4
All ownerships								
Atlantic Provinces[8]	110.2	108.7	45.4	40.0	5.4	63.3		1.5
Quebec	107.4	107.2	92.1	83.5	8.6	15.1		.2
Ontario	140.9	140.9	106.3	98.1	8.2	34.6		0
Prairie Provinces[9]	181.2	171.8	103.1	82.3	20.8	68.7		9.4
British Columbia	128.4	118.8	118.8	108.2	10.6	0		9.6
Northwest and Yukon Territories	80.6	77.6	24.7	19.0	5.7	52.9		3.0
Total	748.7	725.0	490.4	431.1	59.3	234.6		23.7

[1]Land whose primary use is for forestry and capable of producing a total wood volume of 429 cubic feet per acre or more.
[2]Forest land that is available for the growing and harvesting of forest crops.
[3]Land that by law is not available for the growing and harvesting of forest crops.
[4]Forest land that is capable of producing a merchantable stand within a reasonable length of time.
[5]Land that is incapable of producing a merchantable stand within a reasonable length of time. Includes muskeg, rock, out croppings, protection forests, barrens, marshes, meadows, and other similar areas within forest land areas.
[6]Stocked land that is in any stage of maturity.
[7]Land that is capable of producing a merchantable stand within a reasonable length of time, but presently depleted.
[8]Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick.
[9]Manitoba, Saskatchewan, and Alberta.
[10]Not available.

Source: Bowen, Murray G., *Canada's forest inventory—1976.* Environment Canada, Canadian Forestry Service, Forest Management Institute, Inf. Rep. FMR-X-116, 63 p. Ottawa, 1978.

from three-fourths in 1950. As this change suggests, the largest part of the growth in production in the past 10 years or so has been in other grades of paper and board. Since the late 1960's, about all of the expansion of paper and board production has been in British Columbia and the Prairie and Atlantic Provinces. Output in Quebec and Ontario has been relatively stable at approximately 12 million tons a year.

In total, the harvest of timber for all products in 1979 was 5.5 billion cubic feet. This is about 83 percent above that of 1950—an increase substantially below the increases in the production of major timber products. The larger increases in product outputs reflect improvements in timber utilization including increased use of mill residues for pulp manufacture and improved recovery of solid wood products.

Softwoods compose about 95 percent of the Canadian timber harvest. In 1979, a little over half of the softwood harvest came from the forests in British Columbia (table 4.17). There were also substantial harvests in Quebec and Ontario. Nearly all of the remainder came from Atlantic and Prairie Provinces. Most of the hardwood timber harvest originates in Quebec, Ontario, and the Atlantic Provinces (table 4.18).

The Outlook for Timber Harvests. Prospects for future increases in the production of softwood lumber, newsprint, and wood pulp in Canada are of special significance to the United States. Imports of these products account for significant shares of U.S. consumption and U.S. demands for these products are expected to grow over the coming decades.

A recent report by the Canadian Forestry Service[10] indicates that there is a potential for substantial increases in the outputs of all major timber products over the average levels in the 1971-75 years. As shown in the tabulation below, production of softwood lumber, wood pulp, and newsprint is projected to roughly double by 2000:

Year	*Softwood lumber* (Billion board feet)	*Wood pulp*	*Newsprint*
		(Million tons)	
Average, 1971–75	12.7	19.2	8.8
1990	18.5	29.5	11.1
2000	22.6	39.0	14.7

Total consumption of roundwood is projected to increase from 4.5 billion cubic feet in the 1971-75 period to 8 billion cubic feet in 2000. Most of the increase will be of softwood species.

The report by the Canadian Forestry Service also contains projections of the volumes of products expected to be consumed in Canada and of exports to the United States and other offshore markets. The projections of exports to the United States again show substantial increases over the 1971-75 averages, as indicated in the tabulation below:

Year	*Softwood lumber* (Billion board feet)	*Wood pulp*	*Newsprint*
		(Million tons)	
Average, 1971–75	7.0	3.6	6.4
1990	11.5	4.5	7.5
2000	13.6	6.7	10.1

There was very rapid growth in softwood lumber exports to the United States in the latter part of the 1970's and shipments in 1978 of 11.7 billion board feet were above the projected levels in 1990. Exports of other products in the late 1970's, however, remained close to or only moderately above the 1971-75 averages.

[10] Aird, K. L. and J. Ottens. The outlook for timber utilization in Canada to the year 2000. Forestry Technical Report 29, Dep. of the Environment, Canadian Forestry Service, Ottawa. 305 p. 1979.

Table 4.15—*Timber inventory on productive forest land[1] in Canada, by ownership, softwoods and hardwoods, and Province or Territory, 1976*

(Billion cubic feet)

Province or Territory	All ownerships			Public			Private		
	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods
Atlantic Provinces[2]	53.0	42.6	10.4	34.1	29.5	4.6	18.9	13.1	5.8
Quebec	97.6	67.3	30.3	90.5	62.4	28.1	7.1	4.9	2.2
Ontario	150.8	91.4	59.4	135.2	86.0	49.2	15.6	5.4	10.2
Prairie Provinces[3]	90.5	57.4	33.1	90.2	57.3	32.9	.3	.1	.2
British Columbia	274.3	267.0	7.3	263.5	256.7	6.8	10.8	10.3	.5
Northwest and Yukon Territories	15.5	11.3	4.2	15.5	11.3	4.2	0	0	0
Total	681.7	537.0	144.7	629.0	503.2	125.8	52.7	33.8	18.9

[1]Forest land that is capable of producing a merchantable stand within a reasonable length of time.
[2]Newfoundland, Nova Scotia, and New Brunswick. Inventory data not available for Prince Edward Island.
[3]Manitoba, Saskatchewan, and Alberta.

Source: Bowen, Murray G., *Canada's forest inventory—1976*. Environment Canada, Canadian Forestry Service, Forest Management Institute, Inf. Rep. FMR-X-116, 63 p. Ottawa, 1978.

The closeness of the 1978 softwood lumber exports to the projected levels a decade or so ahead and a series of recent studies[11] have raised concern about the capacity of the Canadian forest resource to support increased production of most timber products and exports. In general, the recent studies show that there are fairly large reserves of currently unutilized timber in Canada, but that only part of the unused volume is economically accessible under current price and cost conditions.

For example, one study[12] showed that in 1979 there was an unused softwood timber reserve of about 2 billion cubic feet (table 4.17, fig. 4.9). A total of about 1.4 billion cubic feet of the reserve, however, was judged to be economically inaccessible. An additional volume of 335 million cubic feet was judged to be unavailable for harvest due to adjustments to inventory resulting from factors such as single purpose withdrawals and unexpected insect and fire losses. After an accounting for a deficit supply situation in the Atlantic Provinces, Canada had a net adjusted reserve of 226 million cubic feet of softwood timber in 1979. Most of the adjusted reserve was in Alberta.

Another recent study[13] shows that the economic allowable annual cut for hardwoods in 1976 exceeded the harvest by 1.6 billion cubic feet (table 4.18). The Province of Ontario accounted for over half of the economically available reserve. While exports of hardwood products to the United States have been relatively small, the hardwood timber resource in Canada in the decades ahead could become an important source of pulp and/or paper products.

The results of studies at the Provincial level in Canada also indicate that, given recent levels of management and utilization, the potential for increased production of softwood timber is limited. For example, a study by the Ministry of Forests of British Columbia[14] found that if forest management programs and harvest rates were continued at recent levels, there would be a fall down in supply in one region in the Province within 30 years and in several regions within 60 years (table 4.19). For other regions, current harvest rates could be maintained for up to 100 years. The study also found that in total, after the old-growth timber inventory is exhausted, harvests will decline and Provincial supply will be approximately two-thirds of the present harvest if forest management programs are continued at recent levels.

The British Columbia Ministry of Forests has responded to this outlook by proposing a 5-year program centered on harvesting, silviculture, and protection of the forest. Pending detailed examination of the forest resources of the Province, and the implications of alternative harvesting rates for supply regions within the Province, the average overall timber harvesting program will be continued about the present level from 1980 through 1985. The type and level of silvicultural practices such as fertilization will be expanded. More money will be spent on management of forest fires, insects, and diseases.

The implications of the British Columbia program are not clear at this point. The 5-year program is being proposed as a first step in helping to insure a long-term resource base for the industry of the Province. The report does not propose any changes in policies affecting harvest by the existing industry of the Province during the period 1980-85.

The "falldown" of harvest following removal of old-growth timber inventories is not unique to British Columbia, and similar situations may exist in other Provinces. The possible effects of this type of resource situation in Canada on exports to the United States will depend in large part on the policies and programs developed by the various Provinces and the Federal government in response to specific supply problems.

There is every indication of wide-based support for policies and programs which will increase Canadian timber supplies. For example, various papers presented at the recent Canadian Forestry Congress[15] indicate strong support of intensified management from Federal and Provincial governments, labor, and industry. This is to be expected because of the importance of the timber industry to the Canadian economy—roughly 1 worker in 10 in Canada relies for employment

[11] F. L. C. Reed and Associates Ltd. Canada's reserve timber supply—the location, delivered cost, and product suitability of Canada's surplus timber. Unpublished report prepared for the Department of Industry, Trade and Commerce, Ottawa, 195 p. plus app. 1974. F. L. C. Reed and Associates, Ltd. Forest management in Canada—Vol. 1. Unpublished report prepared for the Forest Management Institute of the Canadian Forestry Service, Ottawa, 311 p. plus app. 1977. F. L. C. Reed and Associates, Ltd. Recent reduction in the Canadian timber base. Unpublished report prepared for Woodlands Section, Canadian Pulp and Paper Association, Montreal, 46 p. plus app. 1980.

[12] F. L. C. Reed and Associates, Ltd. Recent reduction in the Canadian timber base. *Ibid.*

[13] F. L. C. Reed and Associates, Ltd. Forest management in Canada—Vol. 1. *Op. cit.*

[14] British Columbia Ministry of Forests. Forest and range resource analysis report, 27 p., and forest and range resource analysis and 5-year program summary, Victoria, B.C. 21 p. 1980.

[15] Pulp and Paper Industry of Canada. The forest imperative. Proceedings of the Canadian Forestry Congress. Toronto. 127 p. 1980.

Table 4.16—*Timber harvest and timber product production in Canada, by product, specified years 1950–79*

Year	Total timber harvest	Lumber: Total	Lumber: Softwoods	Lumber: Hardwoods	Plywood (¼-inch basis): Total	Plywood (¼-inch basis): Softwoods	Plywood (¼-inch basis): Hardwoods
	Billion cubic feet	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*
1950	3.0	6.6	6.1	0.5	0.5	0.4	0.1
1955	3.3	7.9	7.5	.4	1.2	1.0	.2
1960	3.3	8.0	7.6	.4	1.6	1.4	.2
1965	3.7	10.8	10.3	.5	2.7	2.3	.4
1966	3.8	10.6	10.0	.6	3.0	2.6	.4
1967	3.8	10.3	9.7	.6	3.1	2.7	.4
1968	4.0	11.4	10.8	.6	3.3	2.9	.4
1969	4.3	11.5	11.0	.5	3.4	3.0	.4
1970	4.3	11.3	10.8	.5	3.1	2.8	.3
1971	4.2	12.0	11.6	.4	3.0	2.6	.4
1972	4.4	13.3	12.8	.5	3.2	2.8	.4
1973	5.1	14.8	14.2	.6	3.5	3.0	.5
1974	4.9	13.6	13.0	.6	3.0	2.6	.4
1975	4.1	11.6	11.2	.4	3.1	2.8	.3
1976	5.0	15.4	14.9	.5	3.6	3.3	.3
1977	5.1	17.6	17.2	.4	3.9	3.5	.4
1978	5.5	19.0	18.5	.5	4.2	3.8	.4
1979[2]	([1])	19.0	18.5	.5	([1])	([1])	([1])

Year	Veneer (1/10-inch basis): Total	Veneer (1/10-inch basis): Softwoods	Veneer (1/10-inch basis): Hardwoods	Paper and board: Total	Paper and board: Newsprint	Paper and board: Other	Woodpulp
	Billion square feet	*Billion square feet*	*Billion square feet*	*Million tons*	*Million tons*	*Million tons*	*Million tons*
1950	0.4	0.2	0.2	6.8	5.3	1.5	8.5
1955	.6	.3	.3	8.0	6.2	1.8	10.2
1960	.7	.5	.2	8.9	6.7	2.2	11.5
1965	1.4	1.0	.4	10.9	7.7	3.0	14.6
1966	1.9	1.5	.4	11.9	8.4	3.4	16.0
1967	1.8	1.4	.4	11.6	8.0	3.5	15.9
1968	1.9	1.5	.4	11.8	8.0	3.6	16.8
1969	2.3	1.9	.4	12.9	8.8	4.0	18.6
1970	2.2	1.9	.3	12.8	8.7	4.0	18.3
1971	2.5	2.2	.3	11.9	8.5	4.2	18.2
1972	2.7	2.4	.3	12.8	8.8	4.7	19.2
1973	2.9	2.6	.3	13.5	9.1	5.2	20.5
1974	2.4	2.1	.3	14.6	9.5	5.1	21.7
1975	2.3	2.1	.2	11.1	7.7	3.4	16.7
1976	([1])	([1])	([1])	13.0	8.9	4.1	19.8
1977	([1])	([1])	([1])	13.4	8.8	4.6	20.0
1978	([1])	([1])	([1])	14.7	9.6	5.1	22.0
1979[2]	([1])	([1])	([1])	14.9	9.6	5.3	21.5

[1]Not available.
[2]Preliminary.

Source: Data based on information supplied by Environment Canada, Canadian Forestry Service, Ottawa.

on the timber sector of the economy.[16]

At the present time, estimates of future increases in Canadian timber harvests must be largely a matter of judgment.[17] A report prepared for the Canadian Council of Resource and Environment Ministers suggests a goal of a 50-percent increase in harvests by 2000.[18]

Although his goal may not be reached, there is clearly a large potential in Canada to increase roundwood harvests through intensified management, more use of hardwoods, and improved utilization. In addition, rising prices for timber products, which seem to be in prospect, will provide incentives to develop the technologies, infrastructures, and processing facilities necessary to utilize the timber reserves that are currently considered to be economically inaccessible.

Prospective Trends in Timber Supplies from Tropical Hardwoods

For a long time, trade in tropical hardwood timber was dominated by the flow of logs from West Africa to Europe. In the 1960's, this trade began to be overshadowed by the large flow of tropical hardwood timber from Southeast Asia—particularly Indonesia—to the rapidly expanding Japanese market. Part of this material was reexported as finished products and ended up in U.S. hardwood markets, particularly as hardwood plywood.

As the Japanese economy continued to expand, more and more of the imports were consumed in domestic markets. Export markets, in the U.S. and other areas, meanwhile, were taken over by in-transit producers in other countries such as Taiwan and Korea which had also begun to import and process tropical hardwood logs from Southeast Asia. The United States is now dependent on producers in the Asia-Pacific region for about two-thirds of its hardwood plywood supplies. In addition, tropical woods provide about 9 percent of the combined Japanese and European consumption of industrial wood products.

In recent years, there has been growing concern about the capacity of the tropical hardwood forests to meet increasing world demands for tropical hardwood products. In part, this has arisen because of attempts by producing countries to exert greater control

[16] Department of Industry, Trade, and Commerce. Review of the Canadian forest products industry. Forest Products Group, Resource Industries Branch. Ottawa. 268 p. 1978.

[17] The results of case studies of forest management in selected areas of Canada were reported by F. L. C. Reed and Associates, Ltd. in Forest Management in Canada—Vol. 2. Canadian Forestry Service, Forest Management Institute, Information Report FMR-X-103. Ottawa. 1978. The amount of money spent on forest management in Canada is discussed in the following: Les Reed. Forest management expenditures in Canada compared to taxes generated by the forest sector. Pulp and Paper Canada. Vol. 80, 1–5. 1979.

[18] Forestry imperatives for Canada: A proposal for forest policy in Canada. Prepared for the Canadian Council of Resource and Environment Ministers. 1979.

Table 4.17—*Softwood timber harvest in 1979 and allowable annual cut in Canada, by Province or Territory*

(Million cubic feet)

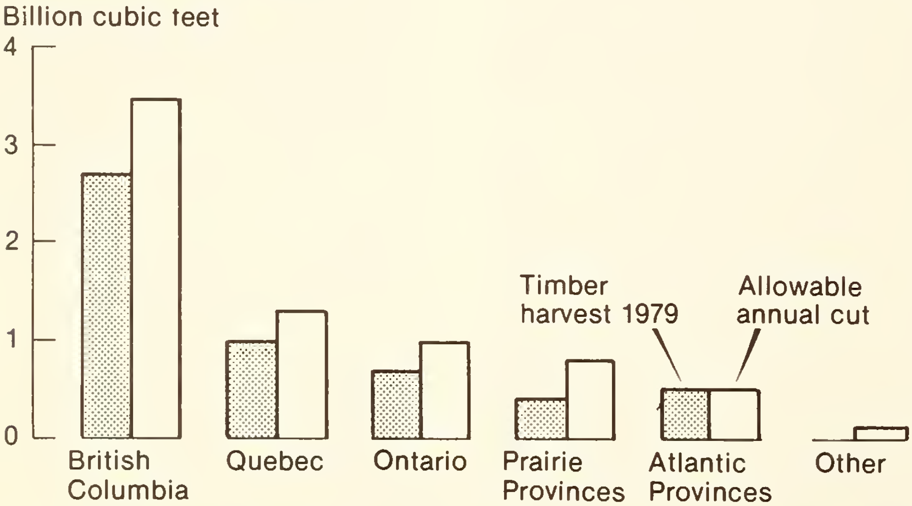
Province or Territory	Timber harvest 1979[1]	Allowable annual cut[2]				
		Total	Theo-retical reserve[3]	Econom-ically inacces-sible[4]	Other offsets[5]	Adjusted reserve[6]
Atlantic Provinces[7]	494	488	−6	74	0	−80
Quebec	1,049	1,338	289	247	0	42
Ontario	682	957	275	226	49	0
Prairie Provinces[8]	379	845	466	198	21	247
British Columbia	2,684	3,510	826	562	265	0
Northwest and Yukon Territories	7	109	102	85	0	17
Total	5,295	7,247	1,952	1,392	335	226

[1]Based on information from Statistics Canada and direct contacts with Provinces.
[2]The average volume of timber which could be harvested annually under management as estimated by the Provinces or Territories.
[3]Allowable annual cut minus harvest.
[4]Judgments of economic accessibility are based upon criteria such as location relative to infrastructure, timber quality, terrain and delivered wood costs.
[5]Includes the effects of single purpose withdrawals, environmental protection areas, past neglect of forest renewal, unexpected insect and fire losses, and revisions in inventory.
[6]Theoretical reserve minus volume economically inaccessible and other offsets.
[7]Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick.
[8]Manitoba, Saskatchewan, and Alberta.

Source: F. L. C. Reed and Associates, Ltd. *Recent reductions in the Canadian timber base.* Unpublished report prepared for the Canadian Pulp and Paper Association, Woodlands Section, 46 p. plus append., Montreal, 1980.

Figure 4.9

Softwood Timber Harvest and Allowable Annual Cut in Canada by Province



over their timber resource and realize additional benefits from its domestic manufacture. Generally, less than half of the log volume is processed in the primary tropical producing countries; the bulk is exported in unprocessed form.

However, the major concerns about the future supply potential of the tropical hardwood forests arise from the multitude of demands which are being placed on these resources and the resulting depletion. In addition, the capability of many of the countries with tropical hardwood forests to manage these resources in a continuing fashion is a matter of great uncertainty.

Statements of the status of the tropical hardwood forests range from "inexhaustible" to "rapidly disappearing." Probably the truth is somewhere in between although there is increasing cause for concern about the management and use of tropical hardwood species. One estimate indicates that about 42 percent of the world's climax tropical moist forest area has been lost.[19] Losses of this size put increasing pressures on the remaining resource to provide basic necessities for local populations as well as to supply industrial wood for both domestic and export purposes. In addition, there is increasing concern about the impact of exploitation on possible global benefits of the tropical moist forest such as their possible macroclimatic effects or even as a reservoir of genetic diversity. Although such impacts might have profound consequences, knowledge of these impacts is at best rudimentary.

Generalizations on the status of tropical hardwood forests tend to mask the wide variation which exists within these resources. Nonetheless, overall estimates of areas and volumes do give a perspective on the resource. In a recent assessment, the area of tropical closed forest, nearly all hardwoods, was estimated at 2.5 billion acres with over half of the area located in Latin America. Africa has large areas of open woodlands but its closed tropical forest is relatively limited. The Asia-Pacific region, which has been the major world supplier of tropical hardwoods for over the past decade, contains only one-fourth of the total area of closed tropical forest.

Estimates of the tropical forest area must be further qualified as to stocking and commercial volumes per acre to derive estimates of the supply potential. Closer examination of the forests of the Asia-Pacific region, for example, indicates that only a small portion of the area is undisturbed. In peninsular Malaysia, nearly half of the closed forest area has been logged or disturbed by shifting cultivation and on these areas the residual volume per acre is only half of that found on undisturbed areas. Average for the entire Asia-Pacific region is estimated at 1,250 cubic feet per acre. The average per acre volumes are estimated at 1,950 cubic feet in Latin

[19] Sommer, Adrian. Attempt at an assessment of the world's tropical moist forests. Unasylva 28(112–113):5–24. 1976.

America and 3,250 cubic feet in Africa.[20]

Although the above figures indicate substantial stocking per acre, the usable volumes are considerably less after allowance is made for accessibility and merchantability. For example, only 31 percent of the growing stock in Latin America is classified as currently merchantable and only 22 percent of the Brazilian closed forest is considered accessible. For Africa, only 12 percent of the closed forest volume is considered "commercial."

As a reflection of the poor accessibility and high percentage of unmerchantable species, the volumes harvested per acre in the tropical forests are relatively low. In tropical Africa, for example, commercial harvests only range up to 430 cubic feet per acre. In portions of the Asia-Pacific region, the growing stock volumes are lower than those found elsewhere, but a much larger proportion consists of currently preferred species. As a result, the volumes harvested per acre are much higher than those of other regions. In Sabah and parts of Indonesia and the Philippines, harvest averages 700 to 850 cubic feet per acre. In Latin America, the problem of unmerchantable species is particularly acute and harvest averages only 70 to 140 cubic feet per acre. For the entire tropical region, the total harvest of industrial hardwood averages only 0.085 percent of the total volume of hardwood growing stock. This ranges from a high of 0.3 percent in the Asia-Pacific region to a low of only 0.032 percent in Latin America.

Extremely low levels of industrial harvest relative to growing stock are symptomatic of both the problems and the opportunities associated with future development of the tropical hardwood resource. Expansion into inaccessible tropical areas will require substantial investments to develop the necessary infrastructure. The Food and Agriculture Organization estimates that during the period 1976-94, an average of $5.6 billion per year should be invested in logging and primary transportation.[21] Furthermore, a larger share of the investment funds must be aimed at supplying the basic necessities of the local populations thus easing the pressure on industrial roundwood. The establishment of strategically located fuelwood plantations, for example, has been identified as a critical need in the Asia-Pacific region. In recognition of the supportive role of forestry to development, the World Bank recently announced a policy change to allocate a larger share of resources to rural area afforestation programs.[22] The establishment of rural fuelwood plantations will be an integral component of this new policy.

Despite questions as to their longer term supply potential, the tropical hardwood forests are expected to supply increasing amounts of hardwood timber and products to world markets to the end of the century. For example, in a recent assessment it was estimated that tropical hardwood production will double by 2000 (table 4.20). Exportable surpluses will not expand that rapidly since increasing amounts will be required for domestic consumption in the tropical hardwood countries. Nevertheless, this still implies a substantial increase in the volume available for export.

The most rapid growth in projected production is in Latin America although the largest volume continues to be in the Asia-Pacific region. This

[20] Pringle, S. L. Quantity and quality of the tropical forests. Paper presented at the International Conference for Improved Utilization of the Tropical Forests, Madison, Wisc. May 21–26, 1978.

[21] Food and Agriculture Organization of the United Nations. Development and investment in the forestry sector. FO:COFO-7812, Rome. 21 p. 1978.

[22] World Bank. Sector policy paper. Washington, D.C. 65 p. 1978.

Table 4.18—*Hardwood timber harvest in 1976 and allowable annual cut in Canada, by Province or Territory*

(Million cubic feet)

Province or Territory	Timber harvest, 1976	Allowable annual cut[1]		
		Gross physical[2]	Economic[3]	Reserve[4]
Atlantic Provinces[5]	66	172	172	106
Quebec	159	319	213	54
Ontario	121	1,256	1,124	1,003
Prairie Provinces[6]	27	702	527	500
British Columbia	15	0	(7)	(7)
Northwest Territories	(7)	(7)	(7)	(7)
Yukon Territory	(7)	0	(7)	(7)
Total	388	2,449	2,036	1,663

[1]The average volume of timber which could be harvested annually under management as estimated by the Provinces or Territories.
[2]Estimated allowable annual cut on all forest lands except reserved areas, regardless of the economic accessibility of the timber.
[3]Judgments of economic accessibility are based upon criteria such as location relative to infrastructure, timber quality, terrain and delivered wood costs. Includes consideration of all lands except reserved areas.
[4]Economic allowable annual cut minus harvest.
[5]Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick.
[6]Manitoba, Saskatchewan, and Alberta.
[7]Not available.

Source: F. L. C. Reed and Associates, Ltd. *Forest management in Canada.* vol. 1. Unpublished report prepared for Environment Canada, Canadian Forestry Service; Forest Management Institute, Ottawa, 1977.

Table 4.19—*Timber supply outlook for British Columbia under alternative harvest assumptions, by region*

(Years)

Region	Years until forecasted supply falldown begins		
	Harvest rate I[1]	Harvest rate II[2]	Harvest rate III[3]
Bulkley-Northwest	40	40	30
Cariboo	100+	100+	60
Kamloops	60	30	20
Nelson	100+	70	50
Peace River	100+	100+	100+
Prince George	100+	60	40
Prince Rupert	100+	80	40
Vancouver	60	50	40

[1]A decreasing rate of harvest from the volume of wood the Crown contracted to supply in 1977 to the long-run sustainable yield, i.e., the estimated maximum amount of merchantable fiber which can be produced perpetually from the productive forest sites that make up the net productive land base.
[2]A constant harvest rate equal to the 1977 commitment level.
[3]An increasing harvest rate that follows projected increases in industrial consumption for 10 to 20 years and levels off thereafter.

Source: British Columbia Ministry of Forests. *Forest and range resource analysis report*, 27 p., Victoria, 1980.

Tropical hardwood forests contain huge volumes of timber. However, much of this timber is inaccessible or unmerchantable.

region is expected to supply over half of the world's tropical hardwood timber in 2000.

The projected production can only be achieved with higher prices and wider species and grade acceptance. This latter factor will be particularly important in Latin America because of the extremely heterogeneous forests of the region.

Longer term supply prospects will depend on the ability to improve the productivity of the tropical hardwood resource by improved management. Increased productivity is vital if those resources are to compete with alternative uses of the land.[23] At the present time, it appears that the best opportunities are through improved marketing of secondary species rather than through silvicultural manipulation to favor higher value species. Attempts to improve marketing would entail less investment and probably would be subject to less uncertainty.

Longer term economic prospects for management of the natural tropical hardwood forest do not appear promising. Substantial improvements in productivity will be necessary to justify retention of natural forests rather than conversion to plantations or other uses for the land. Greatly improved utilization of secondary species would also be essential.

However, given the present lack of knowledge about the behavior of tropical hardwood forests under management, it is apparent that little can be definitively said about the economics of management. Ecologists, for example, warn that it may not be possible to maintain the tropical moist forest much less whether or not this should be done. The reasons for attempting to manage at least a portion of the tropical forests in a natural state thus concern the unknown impacts of decisions that are probably irreversible. In addition to various ecological and environmental considerations, it may well be that "The best reason for not completely abandoning natural management of moist tropical forests lies in the insurance it provides against the distinct possibility that decisions based on it being an uneconomic proposition could be mistaken."[24]

Prospective Trends in Timber Supplies from Tropical and Subtropical Plantations

With depletion of natural forests in many areas and growing competition for arable land, plantations are increasingly relied on to provide material for construction and other uses. Plantations are considered particularly promising in tropical and subtropical regions because of the very high rates of growth achieved and the difficulties of regenerating and managing the natural forest.

Data on the extent and status of plantations are extremely sketchy because of definitional problems, questions of survival, and so forth. In the mid-1970's, however, manmade forests were estimated at approximately 222 million acres distributed as shown below:

Economic class and region	*Million acres*
Developed	
North America	27
Western Europe	32
Oceania	2
Other	25
Total	86
Developing	
Africa	6
Latin America	8
Asia	6
Total	20
Centrally planned	
Europe and the Soviet Union	42
Asia	74
Total	116
Total World	222

Source: Food and Agriculture Organization of the United Nations. Development and investment in the forestry sector. FO:COFO-78/2, Rome. 21 p. 1978.

Manmade forests compose roughly 3 percent of the closed forest area and include all areas regenerated by artificial means including conventional afforestation and reforestation techniques. Conifers are generally the preferred species although large areas of eucalyptus and gmelina have been established in Latin America, particularly in Brazil.

Not all plantations have been established with wood production the primary purpose and thus may not fully contribute to wood supplies. For example, extensive areas have been planted in northern China primarily for protective purposes such as windbreaks. On the other hand, plantations established for relatively low-value purposes such as fuelwood may release timber from natural stands for higher-value purposes. This is the case in some areas in the Asia-Pacific region. The supply of high-value hardwoods in these areas available for export to other areas is in part dependent on the establishment of plantations which can provide a minimum supply of wood for fuel and rural requirements.

The primary advantage of plantations in the tropics in the substantially higher growth rates achieved—growth rates ten times those for unimproved natural forest are not uncommon. In the Asia-Pacific region, net annual incre-

[23] Leslie, Als. Where contradictory theory and practice co-exist. Unasylva 29(115):2–17. 1977.

[24] *Ibid.*

Table 4.20—*Tropical hardwood timber production and exports, by region, 1970, with projections to 2000*

(Billion cubic feet)

Region	1970		Projections 1980		1990		2000	
	Production	Exports	Production	Exports	Production	Exports	Production	Exports
Asia-Pacific	2.4	0.8	3.2	0.9	4.4	1.0	5.8	1.2
Latin America	.8	(1)	1.1	(1)	1.7	(1)	2.2	(1)
Africa	1.0	.1	1.2	.2	1.5	.2	2.0	.3
Total	4.2	1.0	5.5	1.1	7.6	1.2	10.0	1.5

[1]Less than 50 million cubic feet.

Source: Joint Forestry and Industry Working Party. *FAO world outlook for timber supply.* Study prepared for the United Nations, Food and Agriculture Organization, Forestry Department. Rome.

ment in natural forests ranges from approximately 11 to 29 cubic feet per acre per year. In contrast, productivity in plantations commonly ranges from 150 to 300 cubic feet per acre per year depending on species and location. There are, of course, some significant differences in quality—in general, the wood grown in plantations with rapid growth rates is less dense and has low strengh and other physical characteristics which constrain its use for many industrial timber products.

With improved species and site selection, plantation productivity is projected to increase. For example, in South Asia the annual net increment in eucalyptus plantations is projected to increase from 157 cubic feet per acre in 1970 to 214 cubic feet per acre in 1990; for conifers the projected increase is from 143 to 300 cubic feet per acre per year. As a result of improved productivity and enlarged plantation area, an increasing proportion of total roundwood removals in tropical areas is projected to originate from plantations as shown below:

Roundwood removals from plantations as percentage of total industrial roundwood removals for tropical countries, 1975 and 2000

Region	*1975*	*2000*
Africa	11	40
Asia-Pacific	3	18
Latin America	13	43
All tropical countries	7	33

Source: United Nations, Food and Agriculture Organization, Joint Working Party on Forest Economics and Statistics. Current state of knowledge of the world and regional forest resources. TIM/EFC/WP.2/AC.2/R.11, Geneva, March 19, 1979.

Anticipated gains in productivity will depend in part on the development of improved knowledge of species and site selection and possible detrimental effects on site productivity from succeeding rotations.

In contrast to the situation in the tropics, artificial regeneration in the temperate regions offers much less of a growth advantage over the natural forest. The major advantages in these regions come about more from rapid establishment of the secondary stands, the esablishment of stands of desired species and/or better location of the stands relative to markets. In this context, it should be noted that although the greatest advantages of plantations are thought to exist in the tropical and subtropical regions, the bulk of the planting is being done in the temperate regions. As of the mid-1970's, less than 10 percent of the area of manmade forest was located in the tropical and subtropical regions. If the tropical and suptropical regions are to realize their unexploited potential, planatation establishment will have to be accelerated in these regions in future years.

Prospective Trends in Timber Supplies from the Soviet Union

Forests of the Soviet Union occupy nearly 2 billion acres or roughly one-quarter of the world's closed forest and about equal to the forest area in North America and Europe combined. These forests contain about 2.2 trillion cubic feet of softwood growing stock or over half of the world's total. In addition, Soviet forests contain about one-third of the world volume of temperate hardwood growing stock.

Industrial roundwood harvest from Soviet forests totals over 10 billion cubic feet or nearly one-quarter of the world's total. About 90 percent of the Soviet harvest is softwoods. Current harvests represent only 0.4 percent of the softwood growing stock; the hardwood growing stock is even more lightly utilized.

Based on these kinds of data, several analysts in the past have concluded that Soviet forests can be expected to supply a much greater proportion of the world's increasing softwood requirements. However, estimates of this potential have been reduced in recent years in recognition of the difficulties associated with the development of the Soviet forest resource. The bulk of the timber is located in remote and largely inaccessible areas. Timber growth is low and the major species is larch which is less preferred on world softwood markets. As a result, the Soviet Union has adopted increasingly conservative estimates of allowable cut with the harvest for 1970 set at roughly one-third of that established for the early 1950's. The 1980 roundwood harvest under the current 5-year plan is targeted at only 2 percent above that established for 1975.[25]

Full development of the Soviet potential has also been hampered by the uneven distribution of forests relative to existing industry and population centers. About three-quarters of the Soviet forest area is located east of the Ural Mountains in Siberia where only 10 percent of the population lives. As a result, the readily accessible forests in the west have been overcut whereas the Siberian forests have been but lightly utilized. The location of the latter forests necessitates extremely long log hauls to existing industry centers.

To correct this dislocation, the Soviet Union is attempting to stimulate the development of industry in the forested regions of Siberia. Surplus supplies of hydroelectric power are also an important factor in locating industry in this region as is the case with the huge complexes being developed on the Angara River.

The Soviet Union is currently the largest world producer of softwood lumber and ranks second to Canada in exports. Substantial gains have also been made in the production of pulp and paper although the Soviet output is still modest relative to major producers. The Nation ranks high in per capita

[25] Sopko, Roland L. USSR prepares next five-year plan. Pulp and Paper International 18(9):42–44. 1976.

consumption of lumber, but paper consumption is low even by eastern European standards.

Soviet exports of forest products consist primarily of roundwood and softwood lumber. These account for nearly three-quarters of the value of all timber product exports. Except for roundwood destined for Japan, eastern European countries have taken a rapidly increasing share of Soviet timber product exports.

Future Soviet export possibilities will be heavily influenced by government direction. To purchase needed foreign-made equipment, the Soviet Union is promoting timber products exports to generate the required foreign exchange. In addition, the Soviet Union is committed to supplying the timber products requirements of the other countries of the eastern European block. Consequently, the Government may require that any increase in output of timber products be directed to the export rather than to the domestic market. In the absence of Government direction to the contrary, there seems little doubt that the domestic market could absorb practically all planned increases in output of timber products, at least for the near term.[26]

Longer term Soviet export possibilities are also dependent on Government assigned priorities. Soviet attempts to relocate industry in remote areas will require extremely large capital investments to develop the necessary infrastructure. Emphasis is also being placed on the production and export of more highly processed products, notably pulp and paper, rather than lumber.

Some of the needed capital for these industrial complexes might be secured through joint ventures such as the Ust-Ilimsk mill which was built in cooperation with members of the Council for Mutual Economic Assistance. But in view of the size and riskiness of these investments in the uncertain markets of recent years, a recent study concluded that substantial increases in investment in forest industry complexes will be deferred until completion of higher priority projects.[27]

The major project currently underway is the Bykal-Amur Railway which is scheduled for completion early in the 1980's. The area made accessible is rich in coal, gas, and mineral resources and these will probably be given priority. The increase in timber harvest that can be attributed to this project will probably be modest, though in general the volume of logging in Eastern Siberia and the Far East can be expected to increase steadily as domestic and foreign demand increases. Even if substantial amounts of new investment in timber industry development were initiated upon the completion of the railroad, it would still require many years for these facilities to attain full production based on past Soviet performance. Consequently, a substantial increase in Soviet output of pulp and paper may not be likely before the end of the century.[28]

In the meantime, exports from eastern Siberia will probably continue to be dominated by softwood logs to Japan. This is a reflection of both the remoteness of this resource to existing Soviet industry and markets and the Japanese desire to import wood in roundwood form. China is another nearby potential market which could become even more important than the Japanese market if political circumstances permit. The share of Soviet exports destined for eastern European countries will likely continue to grow rapidly, primarily due to political reasons. Increasing exports to eastern Europe will probably be balanced by reduced Soviet exports to western European markets.

Other Factors Which Will Influence Trade in Timber Products

Assessments of the timber supply-demand situations in the major timber producing and consuming countries or regions, such as presented above, are useful in identifying the timber surplus or deficit status of each area. These assessments, however, are useful only as indicators of potential trade flows. A host of factors determines trade flows among surplus and deficit areas.

Factors Affecting World Trade. In general, production and transport costs will have a strong impact on trade flows between individual areas. Growing trade will tend to even out prices worldwide and prices relative to costs will determine which surplus areas benefit from trade opportunities. In the centrally planned economies, however, developments in the timber sector are judged against other national priorities. Forestry development in these countries may be only indirectly related to prices and costs in the market economics.

Trade flows are also affected by tariff and nontariff trade barriers, consumer preferences, differences among countries in language and business practices, the market orientation of producers of timber products and the characteristics of world markets. ,

An easing of tariff and nontariff trade barriers following the "Kennedy Round" of multilateral trade negotiations conducted under the auspices of GATT (General Agreement on Tariff and Trade)[29] facilitated the severalfold expansion of world trade over the late 1960's and early 1970's. For the most part, timber product tariffs on U.S. imports and exports were not much affected by these negotiations. Exceptions include items such as some paper and board products where markets are price-sensitive. For these items, a tariff reduction of as little as 5 percent or less could have a significant impact on U.S. export volume. U.S. trade in timber products was affected significantly, however, by the general economic growth fostered by the interactions of trade liberalization and expansionary monetary and fiscal policies in the industrialized countries.

Nontariff trade barriers include such things as quotas, standards, restrictions on the flow of capital, and restrictions on the flow of raw materials. Worldwide, for all trade in commodities, there are literally hundreds of restrictions which could be interpreted as nontariff trade barriers. In world timber markets, major nontariff trade barriers include grading standards for solid wood products, quotas for both solid and fiber-based wood products, and restrictions on the export of logs.

In general in importing countries, tariff and nontariff trade barriers increase as timber products become more highly processed. Thus, there are few restrictions on imports of raw materials such as logs and chips, but most countries have some form of restriction on imports of lumber, plywood, and paper and board products. In exporting countries, there are few restrictions on the export of finished products, but many countries either already have restrictions on raw material exports, or they

[26] North, Robert N. and Jan J. Solecki. The Soviet forest products industry: its present and potential exports. Canadian Slavonic Papers 19(3):281–311. 1977.

[27] Eidem, R., L. Nyberg, T. Ekstrom, T. Beconovic, and R. L. Sopko. Pulp and paper industry in the U.S.S.R. DIROSAB, The Institute of East European Market and Economic Research, Stockholm. 244 p. 1976.

[28] *Ibid.*

[29] This refers to the general agreement on tariff and trade signed by participating countries at the conclusion of the negotiations. It also refers to an organization headquartered in Geneva, which provides a framework for carrying on negotiations on international trade matters.

are considering restrictions. Examples include restriction on log exports in North America, Southeast Asia, and Africa.

Nontariff barriers can be prohibitive in that market access is denied. Tariff barriers may have the effect of being prohibitive in that the cost of a product plus the tariff makes imports noncompetitive with similar products manufactured in the importing country. Tariffs, however, typically do not prohibit access through an absolute denial of market entry.

Both tariff and nontariff barriers were the subject of the "Tokyo Round" of multilateral trade negotiations, also conducted under the auspices of GATT, which were concluded in April 1979 in Geneva. Participating countries agreed to a phased 33 percent average tariff cut beginning in 1980. Of even greater potential importance are agreements reached to reduce nontariff barriers although these measures will require additional time to implement.

Independent of GATT, the primary producers of tropical hardwoods have initiated discussions of ways and means to stabilize prices and/or output of tropical hardwood logs and timber products. These discussions have been held under the auspices of the United Nations Conference on Trade and Development (UNCTAD). The possible end results of these discussions are not clear at this time. There is potential, however, for significant impacts on the worldwide flow of tropical hardwood logs, lumber, and plywood.

Construction practices and consumer preferences also influence trade in timber products. As described above, North American industry has been promoting the use of the platform frame construction method of house building in both Japan and Europe. To date, these promotion efforts have had limited success, but they ultimately could have important effects on softwood lumber and plywood exports.

Consumer preferences directly influence the export market potential for packaging and other types of paper and board products. Consumer preferences also influence the extent of use of fiber-based construction materials. For example, the use of particleboard in home construction is much more widely accepted in Europe than in Japan or North America.

Government-sponsored timber supply programs and development incentives also impact on the availability of timber for both domestic and export markets. In the centrally planned economies, government priorities influence forestry-related development and trade flows. For example, the priorities of the Soviet Union in developing the timber resources of Siberia will have a major impact on world supplies of softwood timber products in the decades ahead. The willingness of the Soviet Union to continue harvest rates in the European sector of the country despite uncertainty over their sustainability will determine in part the future timber supply situation in western Europe.

In the developing countries, governmental direction appears to be playing a key role in proposals for construction of timber processing facilities. Direct government participation in these ventures has the potential to change the responsiveness of world trade patterns to prices and costs. For example, during market downturns, the governments of developing countries may be willing to absorb operating losses in order to maintain stability and employment and other social aspects of economic development.

The post-World War II rise in world consumption of timber products was made possible to a large extent through expansion of timber harvest in previously undeveloped areas—harvest at the extensive margin. Examples include the harvest of hardwood timber in Southeast Asia and softwood timber in northern and western Canada, eastern Siberia, and on the National Forests in Alaska, Washington, Oregon, and California.

As described in various ways above, there is room for further expansion of this kind. However, by the turn of the century, much of the current inventory of preferred tropical species will probably have been harvested. Supplies from the Soviet Union will depend on government priorities over the next two decades. Access to undeveloped resources in Canada will depend on the future course of world prices for timber products and on the role taken by the public agencies in promoting development.

High timber product prices will undoubtedly lead to greater use of the resources of northern Canada, and those in other regions that are presently not economic. Higher prices will also provide incentive for intensification of timber management and improved utilization in the United States, Canada, Europe, Japan, and tropical areas.

The extent to which more intensive management efforts underway in the United States and other countries will add to supplies is uncertain. Substantial investments are being made, however, and the success of management practices is obvious in specific instances. More intensive management of timber resources in the developed countries may reduce the need for use of the presently unused resources in undeveloped areas.

Factors Affecting U.S. Trade. There are a number of other factors which more or less specifically affect U.S. trade in timber products. Following the track of U.S. housing starts, the consumption and price of softwood lumber and plywood in the U.S. market have varied greatly from year to year. This cyclical fluctuation works against sustained development of export markets by U.S. producers. When U.S. markets are good, there is a tendency to reduce export sales. Further, if the export market depends on manufacturing products to other than North American standards, the U.S. producer may hesitate to gear operations to foreign sales because of the risk of being unable to respond to a rise in domestic markets.

The U.S. pulp, paper, and board industry also experiences cycles in domestic markets. Here, too, there is probably a tendency to favor domestic market opportunities. However, because many U.S. mills active in the export market are joint venture operations with European or Japanese investors, there is probably less tendency to do this than is the case in the lumber and plywood industries.

Historically, the lumber and plywood industries in the United States have been characterized by a large number of relatively small independent firms. This lack of concentration plus uncertainties over the legalities of cooperation in the export market have probably accounted for part of the lack of industry cooperation in the development of export markets.[30] In addition, coping with languages and business practices in foreign markets may seem to be insurmountable problems to many small producers.

Summary of Projected Trends in U.S. Imports and Exports of Timber Products

It is apparent from the preceding discussion that many complex factors

[30] For background information on attempts of U.S. timber products industries to cooperate in the export market, see Beuter, John H. Web-Pomerene Export Trade Associations and the wood products industries or can the Webb-Pomerene Act help the U.S. sell more processed wood to Japan? U.S. Dep. Agric., Forest Service, Res. Pap. PNW-74, Pacific Northwest Forest and Range Exp. Sta., Portland, Oreg. 14 p. 1969.

operating in many countries affect U.S. trade in timber products. Despite the complexity, the general outlook for some of the major forces likely to influence trade seems reasonably clear. For example:

1. There is little basis for expecting a significant change in the pattern of the United States being both a major importer and exporter of timber products. Unique characteristics of certain products, the proximity of Canada, competitive pressures between U.S. and foreign producers, and competitive pressures among U.S. producers within the domestic market all indicate a continuing basis for both U.S. imports and exports of timber products.

For the most part, the pattern of trade will continue to be dominated by imports of softwood products from Canada, imports of hardwood veneer and plywood from Asia, exports of solid softwood products from Alaska and the Pacific Northwest to Japan, and exports of pulp, paper, and board products from the West Coast and the South to Japan, Europe, and Central and South America.

2. Demands for timber products, and especially fiber products, have been growing rapidly in the major consuming countries and all recent projections indicate continued growth.

3. There are still substantial unused softwood timber resources in Canada, Siberia, and Alaska and hardwood resources in the tropical forests of Latin America, Africa, and Southeast Asia. There is also a potential for greatly increasing timber supplies by more intensive management in many regions of the world including major consuming areas such as western Europe and consuming countries such as the United States, Japan, and Canada. However, achieving more of the potential, either of the unused resources or from intensified management, will involve higher costs.

4. The prospective timber demand-supply situation indicates that there will be increasing competition for the available supplies of timber products. As a result, timber product prices are likely to show continued increases relative to other prices in the United States and in the major timber producing and consuming countries. These increases will provide incentives for the development of unused resources and the intensification of management. They will also reduce the demand for many timber products and lead to the greater use of substitute materials.

5. The pattern and extent of trade will continue to be influenced by the comparative advantages of the producing regions and by tariff and nontariff trade barriers.

At this time, there is no analytical system which can take into account in some quantitative way these and other forces which impact in some fashion on U.S. imports and exports of timber products. Thus, the projections summarized in tables 4.1 and 4.3 in terms of roundwood equivalent, and in other tables in this study in terms of standard units of measure, are based largely on judgment evaluation of the probable effects of the forces influencing trade.

Projected Trends in Imports. As shown by the data in table 4.1, the base level projections of imports of timber products show substantial growth rising from 3.2 billion cubic feet, roundwood equivalent, in 1977 to 4.5 billion cubic feet in 2030. Most of the growth takes place by 1990 and largely reflects increases in softwood lumber and pulp products.

As indicated in the above discussion of the Canadian situation, increased output of timber products in Canada over the coming decades will depend in large part on intensified management, the effect of rising prices on the economically inaccessible softwood timber resources, and increased use of hardwoods in pulp manufacture. There will also be growing demands in Canada and increasing competition from other importing countries, especially Japan and countries in Western Europe. If the positive effects of intensified management, better utilization, and rising prices result in increased availability of timber as expected, U.S. softwood lumber imports (base level projections) will peak around 2.2 billion cubic feet (13.5 billion board feet) in 1990 and then decline slowly to 1.8 billion cubic feet (11.1 billion board feet) in 2030.

In response to the expected growth in U.S. demand over the coming decades and the generally favorable outlook for intensification of management and utilization in Canada, U.S. imports of pulp products are projected to rise, although relatively slowly, throughout the projection period.

Canadian producers have historically captured a major share of U.S. newsprint markets. With advances in pulping technology, however, the U.S. newsprint industry has grown since World War II to the point where domestic mills account for about one-third of consumption. The trend toward increased production in the United States is expected to continue and this accounts in part for the projected slow growth in imports of paper.

Imports of hardwood plywood and veneer are projected to rise until about 2010 although again most of the growth takes place before 1990. After that, the increasing competition for the available supplies of tropical hardwood timber and the improving hardwood timber supply situation in the United States are expected to cause hardwood plywood and veneer imports to first level off and then begin to decline.

Imports of logs and other products, in line with past experience, are expected to remain small through the projection period.

The above estimates of imports are based on the assumption that changes in prices of timber products relative to the general price level will continue the trends that existed from the 1950's to the early 1970's through the projection period. An analysis of the relationship between projected base level timber demands and supplies, which follows in a later section, indicates that this is unlikely to happen. This analysis also shows that the equilibrium prices—the prices necessary to bring about an equilibrium between timber demands and supplies—are likely to be substantially above those assumed in making the base level projections of imports. With these higher equilibrium prices, imports of softwood lumber, would rise above the base level projections in the early decades of the projection period, then drop below the base level projections in the later decades. That decline reflects in part the effects of rising production costs in Canada relative to costs in the major timber producing regions in the United States (see discussion pages 215 to 218), and in part lower demand.

Projected Trends in Exports. The base level projections of exports of timber products do not change significantly—remaining close to the 1976 level of 1.5 billion cubic feet roundwood equivalent (table 4.3). There are, of course, divergent trends among the major products.

Projected softwood lumber exports rise to about 1.8 billion board feet in 1990 but subsequently show a slow decline—a response to the decreased availability of the high quality clear lumber now produced from the old growth timber in the Pacific Northwest. Hardwood lumber exports show a slow increase through the projection period. This reflects in large part the improved hardwood timber supply situation in the United States.

Projections of exports of wood pulp and paper and board show continued and fairly rapid growth until 2030. This is based in part on the relatively favorable supply situation in the

United States and projected increases in demand in western Europe and Japan. Pulpwood exports, on the other hand, after showing a rise through the 1960's, drop rather rapidly. This reflects an expected decline in the availability of chips for export on the Pacific Coast and increased availability from other sources such as Siberia and tropical plantations.

Softwood log exports, most of which go to Japan, are projected to remain near present levels until 1990 then decline through the decades until 2030. This projection is consistent with (1) the potential decline in housing markets and expanded softwood supplies from domestic sources in Japan after 1990; (2) the potential of expanded softwood supplies from the Soviet Union after 2000, and (3) decreased supplies of old-growth softwoods in the Pacific Northwest after 1990.

Exports of hardwood logs remain unchanged at 0.1 billion cubic feet roundwood equivalent. Exports of other industrial products such as poles, piling, and posts, continue but the volume remains small.

The above projections are based on current expectations about domestic timber resources and a continuation of industry attitudes toward export markets. Effective promotion of timber product exports in the major consuming areas and action to increase domestic timber supplies could greatly change the outlook for exports and particularly for products such as softwood lumber and plywood. As indicated in other places in this study, domestic forests have the potential under intensive management to meet prospective growth in domestic demands while at the same time supporting large increases in exports.

It was assumed that price changes of the sizes associated with maintaining an equilibrium between projected timber demands and supplies would not have significant effects on the export of timber products. Thus, in contrast to imports, the base level and equilibrium projections of exports are the same.

Projected Trends in Net Imports. Given the above projections of base level imports and exports, there will be substantial increase in net imports into the United States, from 1.2 billion cubic feet, roundwood equivalent, in 1976 to 3.1 billion in 2030. Nearly all of the increase takes place by 2010.

Increases in net imports, and especially those projected for the 1980's, can meet part of the projected increases in demand for softwood lumber, hardwood plywood and pulp products. In total, however, the increases are relatively small in comparison to the growth in demand and depend in large part on programs to increase timber harvests in Canada over the next two decades. Thus, in the 1980's and more so in the decades beyond, the United States must look to its domestic timber resources and improvements in utilization as the only hope of meeting the bulk of the projected demands for timber products.

Chapter 5
Primary Timber Processing Industries

Converting the projected increases in timber described above into products usable by consumers will require a large expansion in domestic primary timber processing industries.[1] These industries include establishments engaged in harvesting timber from the forest (logging), and in manufacturing lumber, veneer, and plywood, wood pulp, and other products such as wood containers, pallets, and a wide variety of turned and shaped items.

Characteristics of Primary Timber Processing Industries

According to the most recent Census of Manufactures, there were some 30,850 primary timber processing establishments operating in the United States in 1977 (table 5.1). These establishments employed 645,700 workers and produced products valued at about $45.8 billion. About half of the establishments were in the logging industry, i.e., logging camps and contractors. Twenty-nine percent were sawmills and planing mills. Most of the remainder were classified in "other primary timber manufacturing." Although small in number, the 2 percent of the establishments in the plywood and veneer industry and the 1 percent in the wood pulp industry accounted for nearly half of the value of shipments from all primary timber industries.

There have been some significant changes in the primary timber porcessing industries in recent decades. For example, the number of establishments declined by almost 4,100 between 1958 and 1977 (table 5.1). There was also a small drop in employment. In contrast, the value of shipments, measured in constant 1972 dollars, more than doubled, rising from $12.8 billion to $27.8 billion. As a result of these trends, the number of employees per establishment increased only slightly; however, value of shipments (1972 dollars) per employee grew 122 percent to $900,000.

Because they perform the initial operations in the conversion of standing timber to useful products, almost all primary timber processing establishments are located near sources of stumpage. Moreover, such factors as timber species, size, quality, tract size, and ownership patterns influence the type and size of processing establishments. For example, the predominantly softwood forests of the South supported almost 14,200 primary timber processing establishments, 46 percent of the Nation's total in 1977 (table 5.2, fig. 5.1). The majority of these processors were comparatively small logging contractors and sawmills and planing mills that can efficiently harvest and process the timber produced from the farmer and other private forest ownerships characteristic of the South.

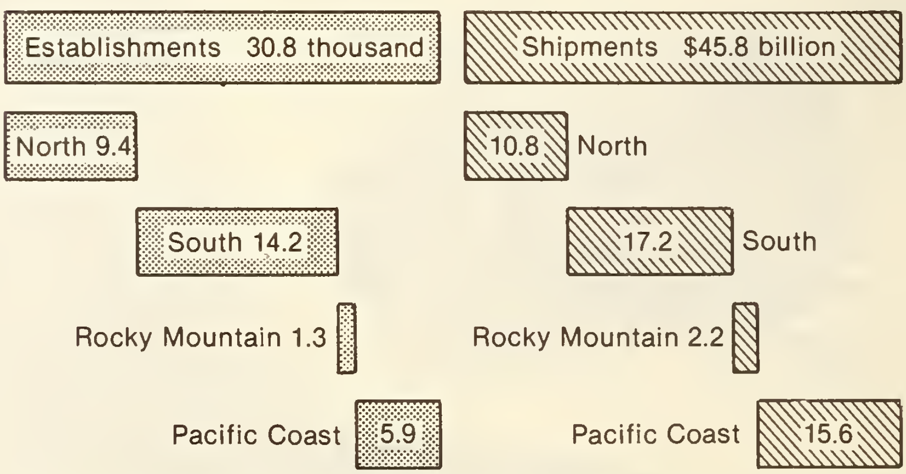
The forests of the North, chiefly hardwoods, but with essentially the same ownership characteristics as in the South, supported nearly 9,500 primary timber processing establishments, almost a third of the total. Most establishments in the section also were small.

The softwood forests of the Pacific Coast, where trees are comparatively large and public ownerships predominate, have fewer, but bigger, logging operations and processing establishments. These establishments, some 5,900 in total, produced over a third of the value of shipments of all primary timber processing industries in 1977. The Rocky Mountain forests, also largely softwood but with somewhat smaller trees, also supported relatively large establishments.

Companies operating a single establishment are most common in the primary timber processing industries.[2]

Figure 5.1

Establishments and Value of Shipments from the Primary Timber Processing Industries, by Section, 1977



[1] The primary timber processing industries as described in this study are composed of the following industries as defined in the Standard Industrial Classification Manual:

Lumber manufacturing:
1. Loggings camps and contractors (SIC 2411)
2. Sawmills and planing mills (SIC 242)

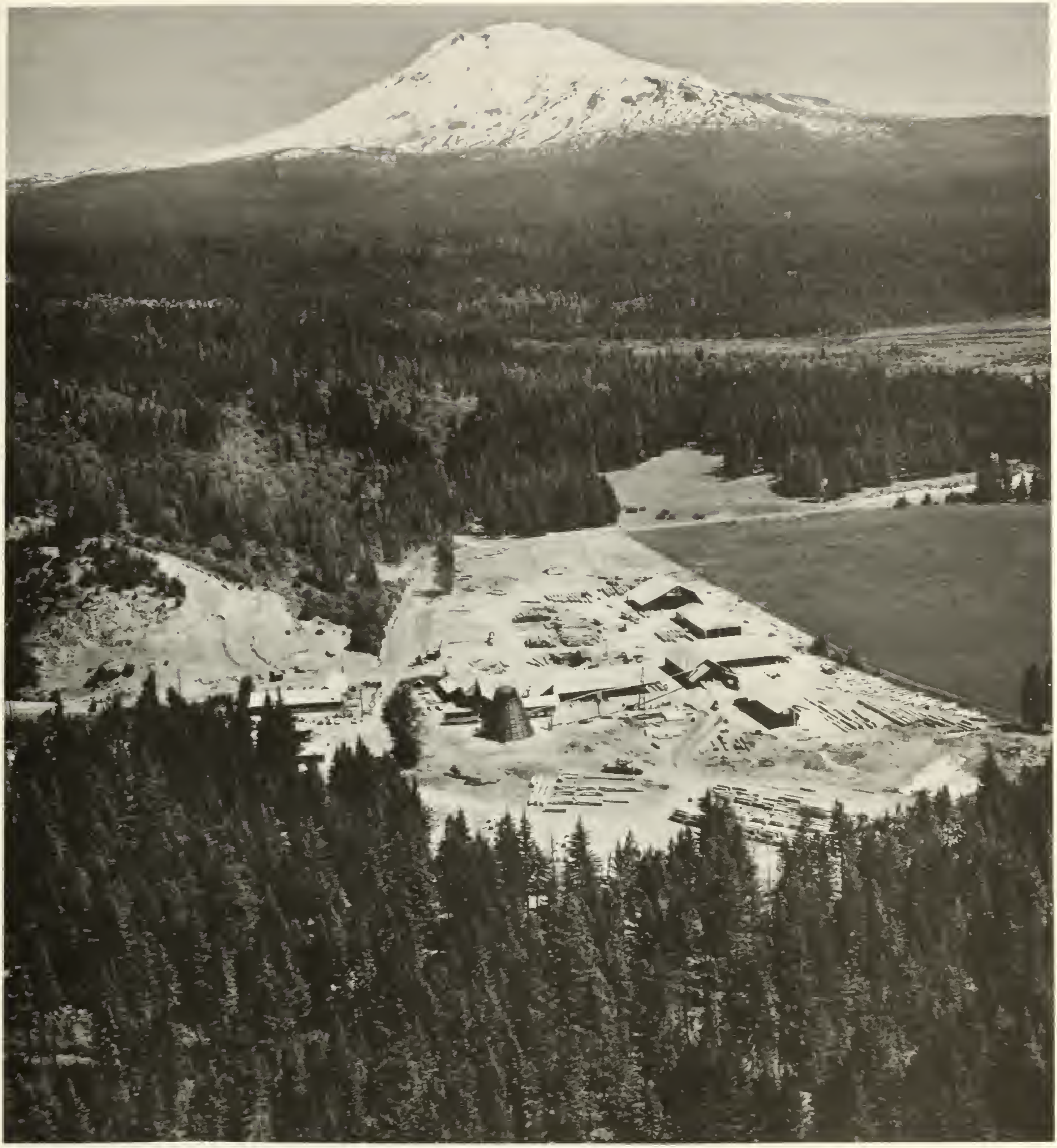
Plywood and veneer manufacturing:
1. Hardwood veneer and plywood (SIC 2435)
2. Softwood veneer and plywood (SIC 2436)

Wood pulp manufacturing:
1. Pulp mills (SIC 2611)
2. Paper mills, except building paper, integrated with a pulp mill (SIC 2621-12)
3. Paperboard mills, integrated with a pulp mill (SIC 2631-12)
4. Building paper and board mills, integrated with a pulp mill (SIC 2662-12)

Other primary timber manufacturing:
1. Wood containers, pallets, and skids
2. Miscellaneous solid wood products (SIC 249)

For more complete definitions, see Executive Office of the President, Office of Management and Budget, Standard Industrial Classification Manual. 615 p. 1972.

[2] Ellefson, Paul V. and Michael E. Chopp. Systematic analysis of the economic structure of the wood-based industry. Univ. Minnesota, College of Forestry, Dep. Forest Resources. Staff Paper No. 3. 1978.



The primary timber processing industries include establishments engaged in producing a wide array of items from posts and poles to lumber, veneer, plywood, paper, paperboard, and wood containers.

This is particularly evident in the lumber manufacturing industry, where 95 percent of the establishments were single unit companies (table 5.3). This also is characteristic of establishments in the "other primary timber manufacturing" industry. On the other hand, in the wood pulp industry, only a quarter of the establishments were single unit companies. The remainder were establishments whose parent companies had operations at two or more locations.

The most common legal form of organization (corporate or noncorporate) is somewhat different in the various primary timber processing industries (table 5.4). Only two-tenths of the establishments in the lumber manufacturing industry had a corporate form of organization in 1972, while over nine-tenths of those in the wood pulp and the plywood and veneer manufacturing industries were corporate in nature. Such differences undoubtedly reflect the

Table 5.1—*Establishments, employees, and value of shipments in the primary timber processing industries in the United States, by industry, specified years 1958–77*

Industry	Establishments					Employees				
	1958	1963	1967	1972	1977	1958	1963	1967	1972	1977
	Number	*Number*	*Number*	*Number*	*Number*	*Thousands*	*Thousands*	*Thousands*	*Thousands*	*Thousands*
Lumber										
Logging camps and contractors	12,828	13,588	16,334	13,238	15,469	71.7	73.1	70.6	80.0	83.3
Sawmills and planing mills	16,859	13,677	11,790	9,448	9,000	282.3	247.7	219.7	204.1	211.3
Total	29,687	27,265	28,124	22,686	24,469	354.0	320.8	290.3	284.1	294.6
Plywood and veneer										
Hardwood veneer and plywood[1]	......	......	......	366	321	.....	.....	.....	25.1	22.3
Softwood veneer and plywood[1]	......	......	......	232	256	.....	.....	.....	43.7	46.2
Total	588	641	667	598	577	59.3	66.2	72.9	68.8	68.5
Woodpulp										
Pulpmills	59	45	61	60	45	14.2	15.1	15.1	10.6	16.2
Integrated mills[2]	266	215	218	271	238	133.4	132.2	142.4	150.4	145.2
Total	325	260	279	331	283	147.6	147.3	157.5	161.0	161.4
Other primary timber	4,312	4,220	4,442	4,760	5,519	99.7	100.2	113.9	119.2	121.2
Total	34,912	32,386	33,512	28,375	30,848	660.6	634.5	634.6	633.1	645.7

Industry	Value of shipments									
	Current dollars					1972 dollars[3]				
	1958	1963	1967	1972	1977	1958	1963	1967	1972	1977
	Millions	*Millions*	*Millions*	*Millions*	*Millions*	*Millions*	*Millions*	*Millions*	*Millions*	*Millions*
Lumber										
Logging camps and contractors	868.3	1,154.7	1,476.2	2,529.5	6,230.1	1,093.6	1,438.0	1,740.8	2,529.5	3,775.8
Sawmills and planing mills	3,302.8	3,648.0	4,046.9	7,173.6	11,969.3	4,159.7	4,543.0	4,772.3	7,173.6	7,254.1
Total	4,171.1	4,802.7	5,523.1	9,703.1	18,199.4	5,253.3	5,981.0	6,513.1	9,703.1	11,029.9
Plywood and veneer										
Hardwood veneer and plywood[1]	....	....	....	911.8	1,272.3	....	....	....	911.8	771.1
Softwood veneer and plywood[1]	....	....	....	2,011.5	3,804.8	....	....	....	2,011.5	2,305.9
Total	884.1	1,339.6	1,687.2	2,923.3	5,077.1	1,113.5	1,668.2	1,989.6	2,923.3	3,077.0
Woodpulp										
Pulpmills	428.0	609.1	730.5	709.9	2,091.1	539.0	758.5	861.4	709.9	1,267.3
Integrated mills[2]	3,460.9	4,189.7	5,437.3	8,227.7	15,157.0	4,358.8	5,217.6	6,411.9	8,227.7	9,186.1
Total	3,888.9	4,798.8	6,167.8	8,937.6	17,248.1	4,897.8	5,976.1	7,273.3	8,937.6	10,453.4
Other primary timber	1,197.1	1,434.2	2,078.3	3,068.7	5,290.2	1,507.7	1,786.1	2,450.8	3,068.7	3,206.2
Total	10,141.3	12,375.3	15,456.4	24,632.7	45.814.8	12,772.4	15,411.3	18,226.9	24,632.7	27,766.5

[1]Separate hardwood and softwood plywood and veneer data not available prior to 1972.
[2]Pulpmills that are directly associated with other types of manufacturing facilities whose primary activity is not the production of woodpulp but some other product, such as paper, paperboard or building paper and board.
[3]Derived by dividing the value of shipments in current dollars by the Bureau of Labor Statistics producer price index of industrial commodities.

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Commerce, Bureau of the Census. *Census of manufactures, 1977. Industry statistics.* Pt. 1. SIC Major Group 20-26. Washington, D.C. 1980.

relatively larger amount of capital necessary to build, operate, and maintain mills in these higher technology industries, particularly those in wood pulp manufacturing. Because in most cases they are larger, the bulk of employment, value added by manufacture, and new capital expenditures originate in corporate establishments.

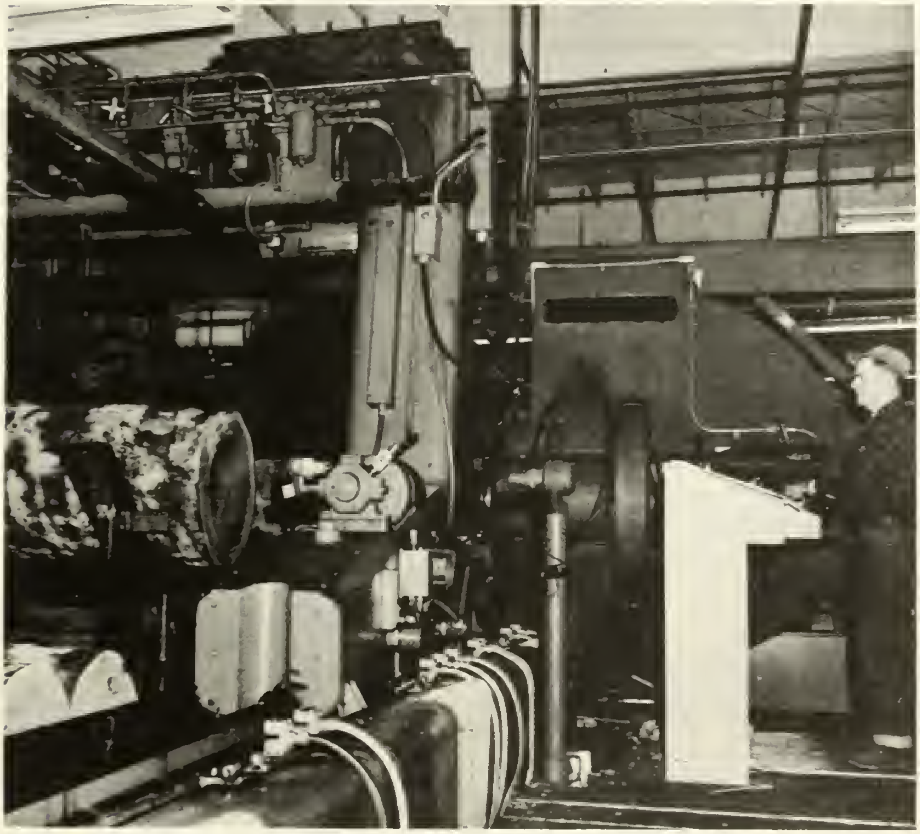
While the primary timber processing industries have historically been composed of a large number of relatively small companies, a trend toward larger and fewer firms is evident. In 1972, the four largest companies in the pulpmill industry (SIC 2611) produced 59 percent of the value of industry shipments compared with 46 percent in 1958 (table 5.5).[3] Similar changes have

[3] U.S. Department of Commerce, Bureau of the Census. Census of Manufactures, 1972. Vol. I. Subject and Special Statistics. Washington, D.C. 1976.

Table 5.2—*Establishments, employees, and value of shipments in the primary timber processing industries in the United States, by section and region, 1977*

Section and region	Establishments		Employees		Value of shipments	
	Number	*Percent*	*Thousands*	*Percent*	*Million dollars*	*Percent*
North						
Northeast	4,442	15	81.9	13	5,210.8	11
North Central	4,987	16	94.9	15	5,621.4	12
Total	9,429	31	176.8	28	10,832.2	23
South						
Southeast	7,390	24	113.0	18	7,644.4	17
South Central	6,779	22	140.3	22	9,602.9	21
Total	14,169	46	253.3	40	17,247.3	38
Rocky Mountain	1,342	4	33.6	5	2,152.1	5
Pacific Coast						
Pacific Northwest	4,048	13	133.0	20	11,907.5	26
Pacific Southwest	1,860	6	49.0	7	3,675.7	8
Total	5,908	19	182.0	27	15,583.2	34
United States	30,848	100	645.7	100	45,814.8	100

Source: See source note, table 5.1.



The historical concentration of the softwood, plywood, and veneer industry in the West reflects dependency on the large-size, high-quality timber available in that area. In recent decades, technical developments have made it feasible to use the relatively smaller-sized southern pine timber in the South.

occurred in the other industries; however, the concentration of production is still fairly limited. About one-third of the value of shipments in the plywood and veneer industry is produced by the four largest firms. In the sawmill and planing mills industry, the four largest firms accounted for only 18 percent of the value of shipments.

Characteristics of the Lumber Manufacturing Industry. In 1977, there were nearly 24,500 establishments in the lumber manufacturing industry (table 5.1). These establishments employed 294,600 people and shipped products valued at $18.2 billion. The employment and value of shipments represented about 46 percent and 40 percent, respectively, of the total for all primary timber processing industries.

The number of establishments and employment in the industry have declined in the past two decades because of the steady decrease in sawmills and planing mills. For example, the number of these establishments dropped from close to 17,000 in 1958, to 9,000 in 1977. Employment declined from 282,300 to 211,300 during the same period (table 5.1). In contrast, the number of logging establishments grew from 12,800 to 15,500 and the number of employees from 71,700 to 83,300. The value of product shipments increased for both logging and sawmills between 1958 and 1977 as logging rose about 3.5 times to $3.8 billion (1972 dollars) and sawmills 1.7 times to $7.3 billion.

The establishments in the lumber manufacturing industry are smaller on the average than those in the other primary timber processing industries. In 1977, over 16,200 or 66 percent of the lumber manufacturing establishments had fewer than 5 employees and 88 percent had fewer than 20 employees (table 5.6).

Half of the Nation's lumber manufacturing establishments were in the South in 1977 (table 5.7). However, they accounted for less than 30 percent of the value of industry shipments (fig. 5.2). The Pacific Coast, where over 60 percent of the Nation's softwood sawtimber is located, had only 4,650 establishments. However, they were relatively large, averaging more than 23 employees compared to fewer than 10 in the North and South, and produced almost half of total industry shipments.

In 1977, about 38 billion board feet of lumber was produced by sawmills. The largest part of this volume, some 31 billion board feet, was softwoods. About 70 percent of this came from mills in the West, 26 percent from the South, and 4 percent from the North. Hardwood lumber production—6.7 billion board feet—was roughly equally divided between the North and South. Only a negligible volume was manufactured in the West.

Characteristics of the Plywood and Veneer Manufacturing Industry. There were 577 establishments in the plywood and veneer industry in 1977 (table 5.1). Employment was 68,500 and the value

Table 5.3—*Establishments in the primary timber processing industries in United States, by type of organization and industry, 1972*

Industry	Total		Operated by—			
			Single unit companies		Multiunit companies	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Lumber[1]	22,686	100	21,554	95	1,132	5
Plywood and veneer	598	100	322	54	276	46
Woodpulp[1]	331	100	82	25	249	75
Other primary timber	4,760	100	4,081	86	679	14
Total	28,375	100	26,039	92	2,336	8

[1]Forest Service estimate based on Bureau of the Census data.

Source: U.S. Department of Commerce, Bureau of the Census. *Census of manufactures, 1972.* vol. I. *Subject and special statistics.* Washington, D.C. 1976.

Table 5.4—*Establishments in the primary timber processing industries in the United States, by legal form of organization and industry, 1972*

(Number)

Industry	Total	Corporate	Noncorporate			
			Total	Individual	Partnership	Other
Lumber[1]	22,686	5,063	17,623	7,726	2,672	7,225
Plywood and veneer	598	549	49	16	26	7
Woodpulp[1]	331	313	18	7	5	6
Other primary timber	4,760	2,969	1,791	876	402	513
Total	28,375	8,894	19,481	8,625	3,105	7,751

[1]Forest Service estimate based on Bureau of the Census data.

Source: See source note, table 5.3.

Table 5.5—*Value of shipments from the primary timber processing industries in the United States, by size of company and industry, 1972*

Industry	Total value	Proportion accounted for by—			
		4 largest companies	8 largest companies	20 largest companies	50 largest companies
	Million dollars	*Percent*	*Percent*	*Percent*	*Percent*
Lumber	9,703.1	18	23	34	44
Plywood and veneer	2,923.3	36	48	65	84
Woodpulp	8,937.6	30	45	70	91
Pulpmills	(709.9)	(59)	(83)	(99)	(100)
Other primary timber	3,068.7	24	32	45	60
Total	24,632.7	25	36	54	70

Source: See source note, table 5.3.

of shipments $5.1 billion. The available data show that both the number of establishments and number of employees in the plywood and veneer industry increased fairly rapidly in the 1960's but have since declined. The downward trend in the 1970's apparently resulted from the closing of small hardwood plants, as the softwood industry continued to grow. Value of shipments, measured in 1972 dollars, nearly tripled between 1958 and 1977; however, the small increase between 1972 and 1977 was entirely due to growth of the softwood industry.

In contrast to the lumber industry, establishments in the plywood and veneer industry are fairly large, averaging 119 employees in 1977, up from 101 in 1958 (table 5.1). Shipments were $5.3 million (1972 dollars) in 1977, about 2.8 times larger than in 1958.

The 321 establishments producing hardwood plywood and veneer composed about 56 percent of those in the plywood and veneer industry in 1977, but shipments and employment were largest in the softwood sector. Establishments producing softwood plywood and veneer accounted for three-quarters of the value of shipments and two-thirds of the employment.

There were 183 hardwood plywood and veneer establishments in the South in 1977, with product shipments valued at $608 million (table 5.8). These numbers represent 57 percent of all establishments and about half of total industry shipments (fig. 5.3). Based on average value of shipments, the 97 plants in the North were nearly a fifth larger and the 41 on the Pacific Coast were about twice as large as those in the South. The Rocky Mountain section did not have hardwood plywood and veneer plants.

The Pacific Coast had 164, or almost two-thirds of the softwood plywood and veneer plants in the United States in 1977, and accounted for 60 percent of the value of shipments—$2.3 billion (fig. 5.3). The South had 78 plants that shipped products valued at $1.3 billion. All but two of the remaining establishments were in the Rocky Mountain section.

The concentration of the softwood plywood industry on the Pacific Coast reflects historical dependency on the large-size, high-quality timber available from the old-growth forests of that region. In recent decades, technical developments have made it feasible to utilize the relatively small-size southern pine trees. As a result of this, lower stumpage costs, and proximity to the major plywood markets in the East, most of the growth in the softwood plywood industry since the mid-1960's has been in the South.

In 1976, softwood veneer log production from the southern pine forests was 3 billion board feet. Most of the remaining production—5.2 billion board feet—came from the Douglas-fir forests of the Pacific Northwest. Hardwood veneer log production in 1976 amounted to 0.6 billion board feet. About two-thirds of this came from the South.

Characteristics of the Wood Pulp Manufacturing Industry. There were 283 wood pulp mills in the United States in 1977 (table 5.1). This included 45 mills that produced only pulp and 238

mills that were integrated with paper, paperboard, building paper, and board mills. Employment, which included workers in the paper and board mills, was 161,400, or 25 percent of total employment in the primary timber processing industries. The combined value of shipments was $17.2 billion.

The establishments in the wood pulp industry are the largest in the primary timber processing industries. Employment averaged 570 in 1977 and 42 percent of the establishments had over 250 employees (table 5.6). Most of the establishments were corporately owned, a reflection of the large capital investments required for a mill large enough to compete successfully in the industry. There was also some concentration in the industry; the four largest companies in the industry accounting for 30 percent of the value of shipments in 1972 (table 5.5). Concentration was somewhat higher for the nonintegrated mills.

The number of mills in the wood pulp industry in 1977 was substantially lower than in 1958 and 1972, but somewhat above the number reported in the early 1960's. Employment increased about 10 percent between 1958 and 1977. Shipments (in 1972 dollars) more than doubled, rising from $4.9 billion in 1958 to $10.5 billion in 1977.

Eighty percent of the establishments in the wood pulp manufacturing industry are located in the East, about equally divided between the North and South. Roughly 80 percent of the industry employment and value of shipments are also located in the East (fig. 5.4). However, because the southern mills are somewhat larger, the South accounts for 46 percent of the national industry employment and value of shipments, in contrast to a little over a third for the North. Almost all of the remaining establishments were in the Pacific Coast section.

Most of the growth in the wood pulp industry in recent decades has been in the South. In large part, this has reflected a relatively favorable timber supply and cost situation. Pulpwood harvests (roundwood) from the forests in this section were 32 million cords in 1976. In addition to the roundwood, about 15 million cords of chips, obtained largely from the byproducts of sawmills and veneer plants, were used in the southern pulp industry in 1976. Total regional consumption amounted to 47 million cords or 65 percent of the wood consumed in United States pulp mills in that year.

The forests in the Pacific Coast section supplied about one-sixth of the wood used in the wood pulp industry

Table 5.6—*Establishments in the primary timber processing industries in the United States, by employment-size class and industry, 1977*

(Number)

Industry	Total	Employment-size class							
		1–4	5–9	10–19	20–49	50–99	100–249	250–499	500+
Lumber	24,469	16,238	2,890	2,360	1,700	714	449	88	30
Plywood and veneer	577	51	27	48	103	126	129	82	11
Woodpulp	283	....	....	10	26	37	92	63	55
Other primary timber	5,519	2,470	795	809	843	358	201	32	11
Total	30,848	18,759	3,712	3,227	2,672	1,235	871	265	107

Source: See source note, table 5.1.

Figure 5.2

Lumber Manufacturing Industry Shipments, by Section, 1977

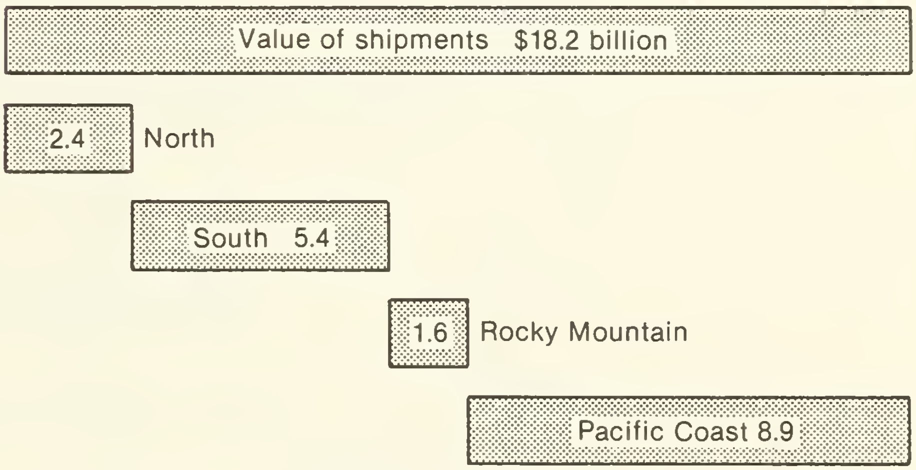


Figure 5.3

Plywood and Veneer Manufacturing Industry Shipments, by Section, 1977

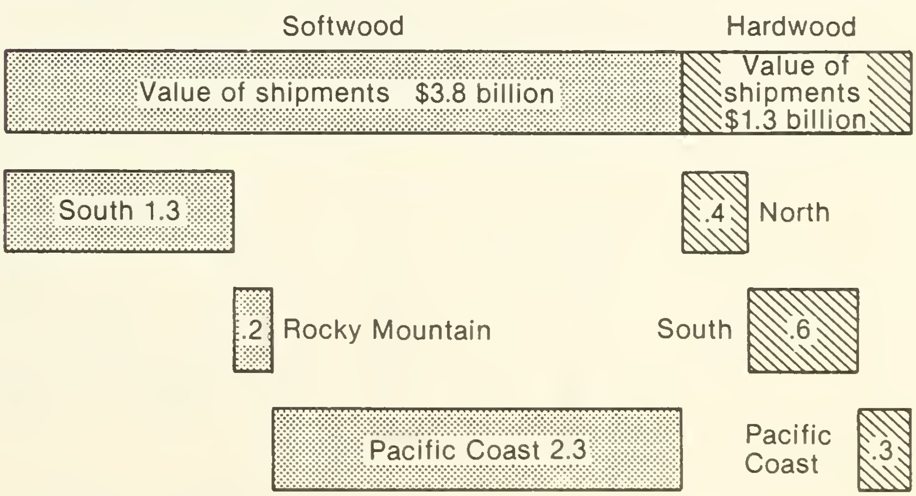


Table 5.7—*Establishments, employees, and value of shipments in the primary timber processing industries in the United States, by industry, section, and region, 1977*

Section and region	Lumber manufacturing			Plywood and veneer manufacturing			Woodpulp manufacturing			Other primary timber manufacturing		
	Establish-ments	Employ-ees	Value of shipments	Establish-ments	Employ-ees	Value of shipments	Establish-ments	Employ-ees	Value of shipments	Establish-ments	Employ-ees	Value of shipments
	Number	*Thousands*	*Million dollars*	*Number*	*Thousands*	*Million dollars*	*Number*	*Thousands*	*Million dollars*	*Number*	*Thousands*	*Million dollars*
North												
Northeast	3,076	27.8	1,299.8	34	2.3	127.9	52	30.5	2,921.8	1,280	21.3	861.3
North Central	3,227	26.5	1,056.7	65	6.3	282.3	58	29.5	2,975.1	1,637	32.6	1,307.3
Total	6,303	54.3	2,356.5	99	8.6	410.2	110	60.0	5,896.9	2,917	53.9	2,168.6
South												
Southeast	6,480	48.3	2,425.6	161	12.3	836.2	50	31.7	3,477.2	699	20.7	905.4
South Central	5,740	58.7	2,965.6	98	14.3	1,040.4	67	42.5	4,537.2	874	24.8	1,059.7
Total	12,220	107.0	5,391.2	259	26.6	1,876.6	117	74.2	8,014.4	1,573	45.5	1,965.1
Rocky Mountain	1,294	26.7	1,558.0	12	3.2	233.1	3	2.8	319.2	33	.9	41.8
Pacific Coast												
Pacific Northwest	3,574	79.4	6,698.5	173	27.4	2,338.1	38	18.9	2,414.1	263	7.3	456.8
Pacific Southwest	1,078	27.2	2,195.2	34	2.7	219.1	15	5.5	603.5	733	13.6	657.9
Total	4,652	106.6	8,893.7	207	30.1	2,557.2	53	24.4	3,017.6	996	20.9	1,114.7
United States	24,469	294.6	18,199.4	577	68.5	5,077.1	283	161.4	17,248.1	5,519	121.2	5,290.2

Source: See source note, table 5.1.

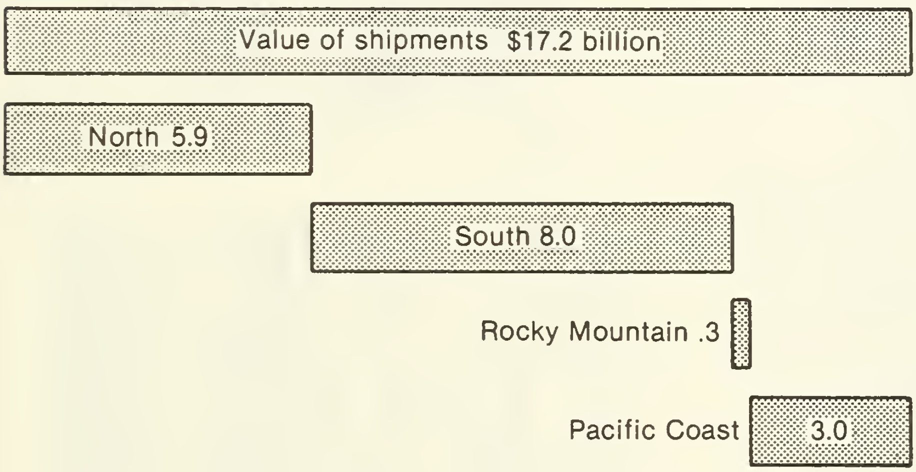
Table 5.8—*Establishments, employees, and value of shipments in the plywood and veneer industry in the United States, by hardwood and softwood and section, 1977*

Section	Establishments		Employees		Value of shipments	
	Hard-wood	Soft-wood	Hard-wood	Soft-wood	Hard-wood	Soft-wood
	Number	*Number*	*Thousands*	*Thousands*	*Million dollars*	*Million dollars*
North	97	2	8.6	0.4	377.4	35.6
South	183	78	10.3	15.9	607.7	1,271.6
Rocky Mountain	...	12	....	3.2	.....	232.3
Pacific Coast	41	164	3.4	26.7	287.2	2,265.3
United States	321	256	22.3	46.2	1,272.3	3,804.8

Source: See source note, table 5.1.

Figure 5.4

Woodpulp Manufacturing Industry Shipments, by Section, 1977



in 1976. Most of this wood was chips obtained as byproducts from sawmills and veneer plants. The forests of the North supplied another 15 percent of the wood consumed, nearly all of it roundwood. The remaining 3 percent came from the forests in the Rocky Mountain section.

Characteristics of the Other Primary Timber Manufacturing Industry. The other primary timber manufacturing industry includes plants making pallets, skids, and particleboard; miscellaneous wood products such as lasts, ladders, and picture frames; and turned and shaped wood products. It also includes wood preservation plants. In 1977, this industry contained 5,519 establishments which employed approximately 121,000 people and shipped products valued at $5.3 billion.

The industry is largely composed of small establishments. In 1977, about 45 percent had fewer than 5 employees and nearly three-quarters had under 20 employees. Although the industry is dominated in terms of numbers by small, single unit firms, the four largest companies accounted for nearly a quarter of the value of shipments.

The number of establishments and employment in the other primary manufacturing industry has been slowly rising in recent years. The value of shipments in constant 1972 dollars increased from $1.5 billion in 1958 to $3.2 billion in 1977. However, growth in the value of shipments has varied greatly among the different types of plants in the industry. Shipments of products such as pallets and particleboard have increased rapidly. Shipments of some other products have remained about the same or have declined.

Many of the products of the other primary manufacturing industry are made from hardwoods; hence, a large proportion of the plants in the industry are located in the East. More than half of the establishments and two-fifths of the employment and value of shipments were in the North in 1977 (table 5.7). An additional 29 percent of the establishments and 37 percent of the employment and value of shipments were in the South. The remaining establishments, 33 in the Rocky Mountains and 996 the Pacific Coast, accounted for less than a fifth of the industry employment and 21 percent of industry shipments.

The characteristics of all of the primary timber processing industries—location, kind of product, size of establishment, and trends in growth—are all strongly influenced by the characteristics of the timber resource. This resource is described in detail in the following chapter and Appendix 3.

Chapter 6
Domestic Timber Resources

Nearly all of the timber consumed in the primary processing industries comes from domestic forests. The following material describes the nature and extent of this resource. It includes information on the amount and location of commercial timberland and its ownership, vegetative characteristics, productivity, stocking, and composition. Information on the location, composition, and ownership of the timber inventory is also presented. Finally, growth, removals, and mortality are discussed.

The presentation is primarily concerned with national trends although considerable information is also presented for the major sections of the country—North, South, Rocky Mountain, and Pacific Coast (fig. 6.1). Detailed regional and State statistics on forest lands and timber resources as of 1977 are presented in Appendix 3; these data have been derived from statistical information collected by the regional Forest Experiment Stations of the Forest Service and published in individual State resource reports.

Forest Land Areas

In 1977, forests occupied some 737 million acres or one-third of the Nation's total land area (table 6.1 and fig. 6.2). These forests varied from the sparsely stocked, shrubby chaparral types used primarily for grazing to highly productive forests which are intensively managed for timber production.

Southern pine forests produce nearly a third of all the timber harvested.

About 482 million acres, or nearly two-thirds of the Nation's forest area, was classified as commercial timberland in 1977. These lands vary widely in timber growing potential, but all are capable of producing at least 20 cubic feet of industrial wood per acre per year, and are available and suitable for growing continuous crops of sawlogs or other industrial timber products. There is another 25 million acres capable of producing at least 20 cubic feet of wood per acre but which is withdrawn from timber utilization by statute or administrative regulation.

The land withdrawn from timber utilization was classified as reserved or deferred. These 20.7 million acres of reserved lands, all of which are publicly owned and concentrated in the West, have been set aside as parks or wilderness areas (Append. 3, tables 3.2 and 3.3). The 4.6 million acres classified as deferred lands are currently being considered for possible inclusion into the Wilderness System.

There is another 229 million acres of forest land that was classified as incapable of producing 20 cubic feet of industrial wood per acre per year. Nearly half of these acres are contained in the fir-spruce and hardwood forests located in Alaska. A third of the nonproductive forest land is chaparral-mountain shrub, pinyon-juniper, and other forest types that occupy extremely adverse sites chiefly in the Southwest. The remainder is found in extremely wet or extremely dry and rocky sites.

Like commercial timberlands, these other forests are of considerable importance for nontimber uses, such as esthetics, recreation, watershed protection, wildlife habitat, and livestock grazing. Limited quantities of roundwood products are also being produced from these lands. Currently, for example, the production of fuelwood from the pinyon-juniper and chaparral-mountain shrub forests is becoming important in some areas in the Southwest.

Commercial Timberland. The Nation's commercial timberlands have an uneven geographic distribution. Nearly three-quarters of the area in 1977 was in the eastern half of the United States—about 166 million acres was in the North and 188 million acres was in the South.

Figure 6.1

Sections and Regions of the United States

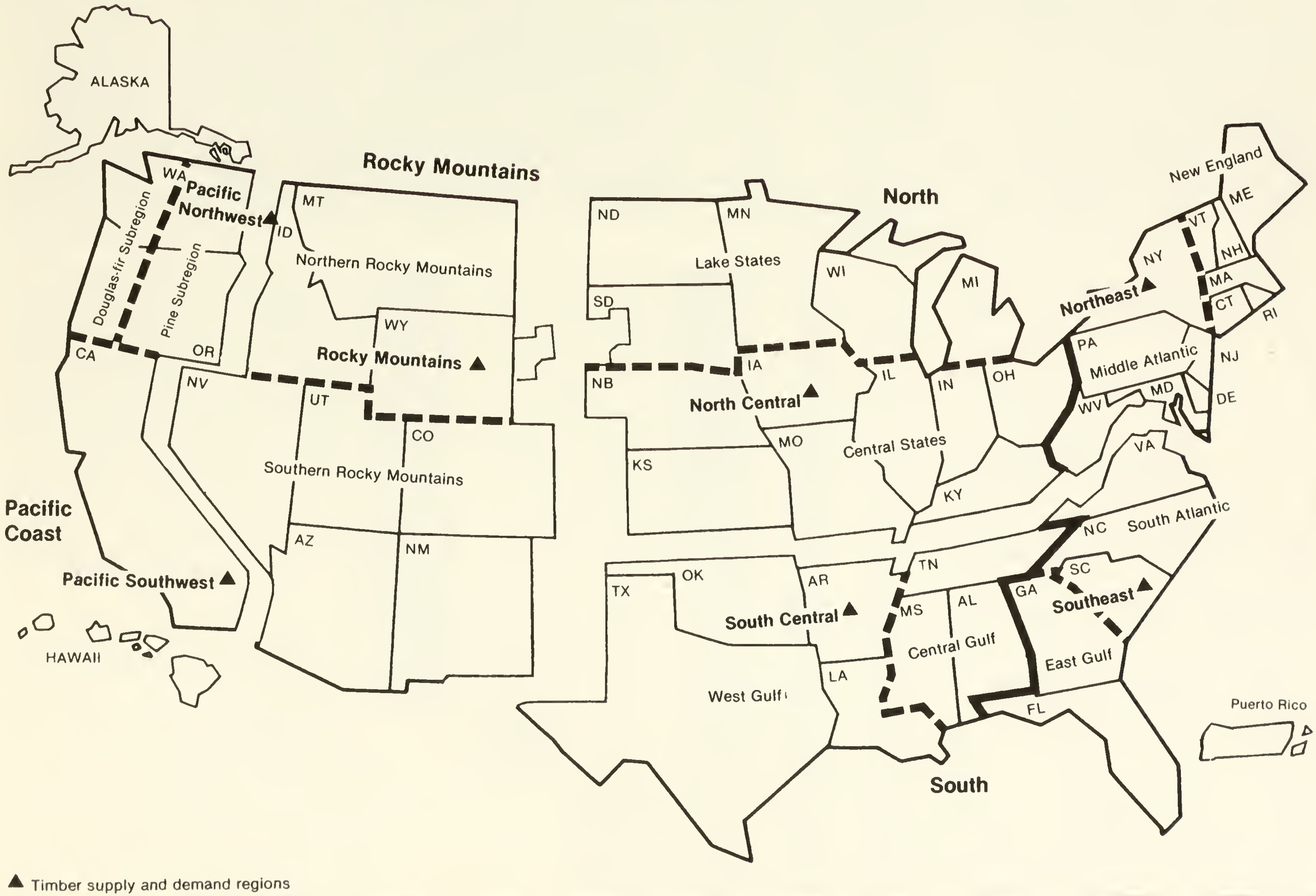


Table 6.1—*Land area of the United States, by section and type of land, January 1, 1977*

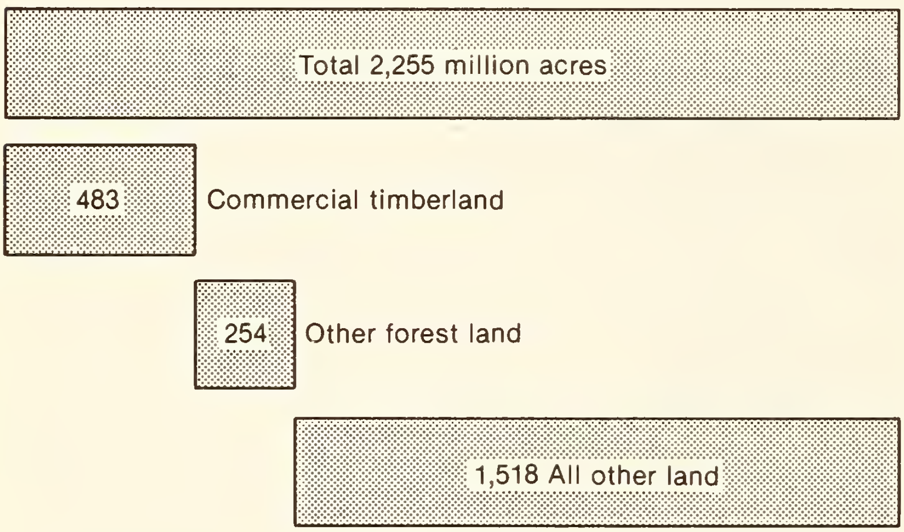
Type of land	Total United States: Area	Total United States: Proportion	North	South	Rocky Mountain	Pacific Coast
	Million acres	*Percent*	*Million acres*	*Million acres*	*Million acres*	*Million acres*
Commercial timberland..	482.5	21.4	166.1	188.0	57.8	70.5
Other forest land						
Productive reserved...	20.7	.9	6.1	2.1	8.4	4.1
Productive deferred...	4.6	.2	.2	.1	3.2	1.2
Other	228.8	10.1	5.3	16.7	68.4	138.4
Total	254.1	11.3	11.5	18.8	80.0	143.7
Total forest land........	736.6	32.7	177.7	206.9	137.7	214.3
Other land[1]............	1,518.2	67.3	445.9	300.3	416.1	356.0
Total land area.........	2,254.8	100.0	623.6	507.1	553.8	570.3

[1]Includes rangeland, cropland, pasture, swampland, industrial and urban areas, and other nonforest land.

Note: Data may not add to totals because of rounding.

Figure 6.2

Land Area of the United States by Type, 1977



Parts of the East are heavily forested. Regionally, the proportion of area in forests varied from 81 percent of the land area in New England, to more than 50 percent in the Middle Atlantic and less than 15 percent in the Central States (Append. 3, table 3.1).

The commercial timberland in the western United States was concentrated in the Pacific Coast States of Oregon, Washington, and California, and in the Rocky Mountain States of Montana, Idaho, and Colorado. The degree of forestation there varied from 55 percent of the total land area in Washington to 24 percent in Montana.

Part of the land in Alaska, perhaps as much as 18 million acres, is likely to be classified as commercial timberland when surveys in the interior of that State are completed.

Trends in Commercial Timberland Areas. The area of commercial timberland in the United States declined steadily from the beginning of settlement until around 1920 as land was cleared for crops, pastures, and various other uses. Then significant acreages of cleared land began to revert to forests over large parts of the East—chiefly on the worked-out cotton lands in the South, the poorer hill farms along the Appalachians and in the Northeast, and the cutover areas in the Lake States. As a result, the area of commercial timberland increased by about 50 million acres to 509 million acres in 1962. A significant part of this change occurred between 1952 and 1962, a period in which the acreage grew by about 10 million acres [1] (table 6.2 and fig. 6.3).

During the late 1950's or the early 1960's, the upward trend in commercial timberland area was reversed as losses exceeded gains. During the 1970's, the rate of losses accelerated, and by 1977 the area of commercial timberland had declined to 482 million acres, 5 percent below 1962.

While every region of the Nation experienced a decline in the 1970's, the reduction was larger for some areas than others. For example, the New England region lost only 179,000 acres as compared to 3.6 million in the northern Rocky Mountains (Append. 3, table 3.4).

A large part of the reduction in commercial timberland in the Rocky Mountains has been the result of reserving additional acreages of public forest land or parks and wilderness in response to the growing demand for additional public outdoor areas. Much of the loss on the Pacific Coast is also attributable to this cause.

The South showed a net reduction of over 4 million acres of commercial timberland between 1970–77. Much of this loss can be attributed to the clearing of forest land for crop land, largely for soybeans, and to a lesser extent for pasture. However, it appears that the pressure for clearing is diminishing. Between 1962 and 1970, the South lost some 7 million acres of forest land of which the West Gulf accounted for some 4 million acres. From 1970 to 1977, the South lost 4 million acres, 2 million of which were in the West Gulf section.

In all regions, the diversion of commercial timberland for highways, reservoirs, urban developments, and other nontimber uses has been significant. The reductions have been largest in the East where most of the population and economic activity are located.

[1] In a sense, 1952 is a benchmark year. It is the first year national estimates of commercial timberland area and of related data on such things as timber inventories, growth, and removals could be compiled based on statistically designed on-the-ground surveys. All earlier data are estimates of varying accuracy and are not fully comparable with 1952 and later data.

Table 6.2—*Area of commercial timberland in the United States, by section and region, 1952, 1962, 1970, and 1977*

(*Million acres*)

Section and region	1952	1962	1970	1977	Change 1970–77
North					
New England	30.9	31.3	31.2	31.0	−0.2
Middle Atlantic	42.1	46.6	46.9	46.4	−.5
Lake States	51.8	49.9	48.5	47.6	−.9
Central	43.9	43.1	42.1	41.2	−.9
Total North	168.8	170.9	168.6	166.1	−2.5
South					
South Atlantic	47.0	47.9	48.5	47.7	−.8
East Gulf	42.1	43.1	41.3	40.1	−1.2
Central Gulf	49.5	53.4	51.5	50.7	−.8
West Gulf	53.5	55.5	51.3	49.6	−1.7
Total South	192.1	199.9	192.5	188.0	−4.5
Rocky Mountain					
Northern Rocky Mountain	38.3	38.6	37.1	33.5	−3.6
Southern Rocky Mountain	25.6	25.8	25.0	24.3	−.7
Total Rocky Mountain	63.9	64.4	62.1	57.8	−4.3
Pacific Coast					
Pacific Northwest	56.3	55.9	55.1	53.3	−1.8
Pacific Southwest	18.2	18.3	18.0	17.3	−.7
Total Pacific Coast	74.6	74.2	73.2	70.5	−2.7
United States	499.3	509.4	496.4	482.5	−13.9

Note: Data may not add to totals because of rounding.

As indicated in the following section of this study, future reductions in commercial timberland probably will not be as great as they have been in the past. The interstate highway system is nearing completion, there are no places for large water impoundments similar to those of the past, and the rate of population growth is slowing down.

Any analysis of net change in commercial timberland such as the above obscures some significant shifts in land use. For example, a recent survey in Mississippi indicated that the commercial timberland base had declined by 388,000 acres. This decline, however, was the result of two changes: the addition of some 1.4 million acres of nonforest land reverting to timberland and a reduction of some 1.8 million acres of timberland to cropland, pastureland, and other nonforest uses. The net change in commercial timberland was small, only 2 percent of the area. There was a much larger effect on the timber resource. Nearly all of the 1.8 million acres of cleared land contained substantial volumes of standing timber that was mostly windrowed and burned, or reserved from cutting. The 1.4 million acres of reverted lands, on the other hand, were nonstocked or understocked abandoned cropland and pastureland, which cannot provide timber harvests for many years.

Ownership of Commercial Timberland. Although there is a lot of variation among regions, in 1977 about 73 percent of all commercial timberland was held by private individuals or firms, with Federal, State, and other public ownerships accounting for the remaining 27 percent (table 6.3). This distribution between private and public ownership has not changed appreciably in the last quarter of a century.

Farmer and other private lands.—Commercial timberlands held by farmer and other private ownerships—a diverse group that includes people from a cross section of the population and firms other than those in the forest industries—contained 278 million acres, some 58 percent of the commercial timberland area (table 6.3). Of the area in these ownerships, about 116 million acres (24 percent of the U.S. total) was owned by farmers.

The combined area of farmer and other private ownerships has followed the general trends described above, rising between 1952 and 1962 then declining until 1977. The area in farmer ownership (fig. 6.3; Append. 3, table 3.4) decreased by about 57 million acres in the 1952–77 period. Some of the decline after 1962 reflects the general loss of commercial timberland to other uses. Most of the decline, however, reflects movement into other ownerships, chiefly the other private. As a result, the area in other private ownership grew by about 39 million acres or 32 percent. Nearly half of the area in farmer and other private ownership is in the South with most of the rest in the North.

Many of the farmer and other private holdings include highly productive timber sites, and most are close to the large markets for timber products. These ownerships consequently have long been of major importance as a source of timber supplies. Although of great importance as a source of timber, many of the farmer and other private ownerships are small, some under 10 acres, and have management objectives that are not compatible with timber harvesting.[2] Part of the acreage in these ownerships is in suburban areas. These factors constrain the management of part of the area in these ownerships as production units, and at any given time, limit the area available for harvest. However, all of these acres grow timber and the available evidence suggests that much of this timber, sooner or later, is used for industrial wood products or firewood.

Forest industry.—There were 69 million acres of commercial timberland in forest industry holdings in 1977—about 14 percent of the total. About 53 percent of these industrial lands were in the South, and 26 percent in the North. Most of the remaining areas were on the Pacific Coast, and were generally composed of the more productive lower elevation lands.

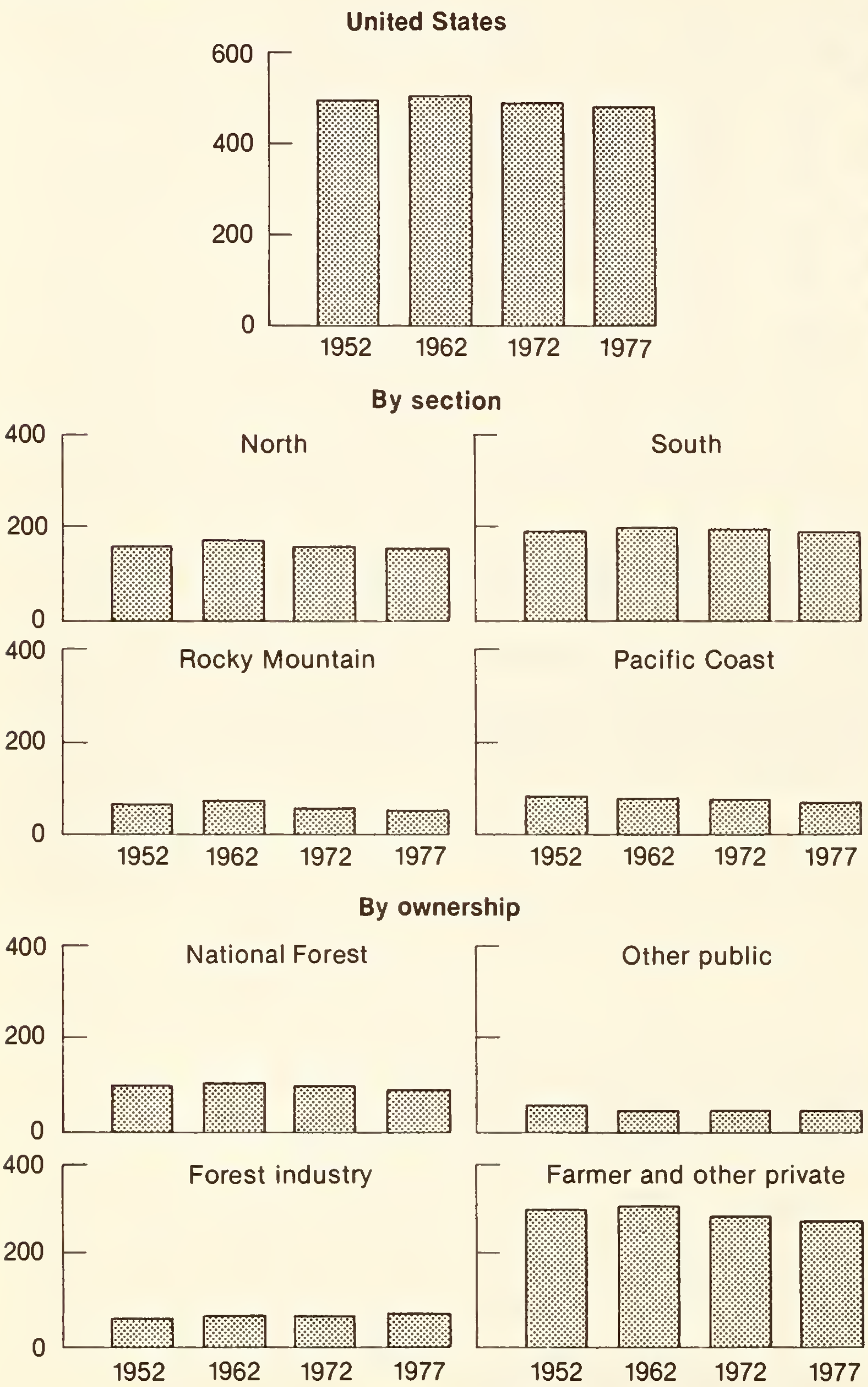
In the 1952–70 period, the area of commercial timberland in forest industry ownerships increased 16 percent or by a little over 9 million acres. By far the largest part of the increase was in the East, where it was about equally divided between the North and South. Nearly all of the added acreage came from farmer and other private ownerships. The increase in the area in forest industry ownership largely took place before 1970. The falloff in the 1970's presumably reflects increasing difficulties in procuring land. In any event, the forest industries have developed active leasing programs and now have substantial acreages of commercial timberland under longterm lease from the farmer and other private ownerships.

National Forest.—Some 89 million acres of commercial timberlands, or 18 percent of the U.S. total, were in Na-

[2] Jones, R. E. and J. S. Paxton. The 296 million acre myth. Am. Forests, Vol. 83:11. Nov. 1977.

Figure 6.3

Commercial Timberland Area Trends, 1952-77
Million acres



tional Forests in 1977. These forests are located largely in the Rocky Mountain and Pacific Coast sections. Most are of relatively low site-quality and located at higher elevations, but these forests nevertheless contain a substantial part of the Nation's timber inventory, as pointed out in a later section of this chapter.

There was some increase in the area of commercial timberland in the National Forests between 1952 and 1962, but since then, and largely in the 1970's, the area has been reduced over 8 million acres. These reductions were primarily in the Rocky Mountain section, and mainly included lands selected for study for possible inclusion into the wilderness system. The permanent status of these lands is now being resolved.

Oak-hickory forests are the most widespread forest type in the United States.

Other public.—Federal lands other than National Forests made up 2 percent of all commercial timberlands in 1977. Lands in western Oregon, administered by the Bureau of Land Management, are of particular importance in this group. State, county, and municipal forests made up 6 percent of the total. Many of these latter holdings were located in the Lake States, and chiefly consist of lands that were cutover and reverted, through tax delinquency, to public ownership during the depression years of the 1930's.

Forest Type Groups. The Nation's commercial timberlands contain a large number of tree species. For statistical and analytical purposes, these species have been grouped into 20 major forest types (table 6.4, Append. 3, tables 3.5 and 3.6) of which 10 occur in the eastern United States and 10 in the West. Areas where tree stocking is not adequate to accurately determine a major forest type are classified as nonstock forest land.

Eastern hardwood forests.—Oak-hickory stands are the most widespread forest type (fig. 6.4). Stands in which these species dominate extend in a widening band southwestward from southern New England to the grasslands of Nebraska, Kansas, Oklahoma, and Texas. Overall, this forest type covers 109 million acres—some 23 percent of the Nation's total commercial timberland. This type takes on different characteristics depending on where it is found; in fact, there are nine separate associations—post oak, black jack oak,

Table 6.3—*Area of commercial timberland in the United States, by section and ownership, January 1, 1977*

Ownership	Total United States Area	Total United States Proportion	North	South	Rocky Mountain	Pacific Coast
	Million acres	*Percent*	*Million acres*	*Million acres*	*Million acres*	*Million acres*
Federal						
National Forest	88.7	18.4	9.8	11.0	36.4	31.5
Bureau of Land Management	5.8	1.2	(1)	(1)	1.7	4.1
Other Federal	4.9	1.0	1.1	3.3	.1	.4
Total Federal	99.4	20.6	11.0	14.3	38.2	36.0
State	23.4	4.9	12.9	2.5	2.2	5.8
County and municipal	6.8	1.4	5.6	.7	.1	.4
Indian	6.1	1.3	1.0	.2	2.7	2.2
Forest industry	68.8	14.2	17.9	36.2	2.1	12.5
Farmer	115.8	24.0	46.0	55.9	8.3	5.6
Other private	162.2	33.6	71.7	78.2	4.2	8.1
All ownerships	482.5	100.0	166.1	188.0	57.8	70.5

[1]Less than 50,000 acres.

Note: Data may not add to totals because of rounding.

Table 6.4—*Area of commercial timberland in the United States, by forest type, 1977*

Forest type	Total area	Proportion
	Million acres	*Percent*
Eastern types		
Softwood types		
Loblolly-shortleaf pine	50.0	10.4
Longleaf-slash pine	16.8	3.5
Fir-spruce	17.6	3.6
White-red-jack pine	11.8	2.4
Total	96.1	19.9
Hardwood types		
Oak-hickory	108.9	22.6
Oak-pine	34.6	7.2
Oak-gum-cypress	26.7	5.5
Maple-beech-birch	36.2	7.5
Elm-ash-cottonwood	22.3	4.6
Aspen-birch	19.2	4.0
Total	248.0	51.4
Nonstocked	10.0	2.1
Total East	354.2	73.4
Western types		
Softwood types		
Douglas-fir	30.9	6.4
Ponderosa pine	26.6	5.5
Fir-spruce	19.9	4.1
Lodgepole pine	12.7	2.7
Hemlock-Sitka spruce	12.9	2.7
Larch	2.4	.5
White pine	.4	.1
Redwood	.7	.1
Other western softwoods	.5	.1
Total	107.0	22.2
Western hardwoods	14.9	3.1
Nonstocked	6.4	1.3
Total West	128.3	26.6
United States	482.5	100.0

Note: Data may not add to totals because of rounding.

black or bear oak; chestnut oak; white oak-red oak-hickory; white oak; northern red oak; yellow poplar-white oak-northern red oak; southern scrub-oak; sweetgum-yellow poplar; and mixed hardwoods.

The commercial value of the oak-hickory forest is as variable as the type itself. Associated with many oak-hickory forest communities is black walnut, the most valuable native tree species in North America. White oak is important to the tight cooperage industry, and has been a perennial favorite for furniture manufacture. Yellow poplar is important for upholstered furniture and container veneers. However, a major deterrent to management of oak-hickory forest has been the lack of adequate markets for low-quality hardwoods, which are a part of most stands.

The relatively valuable swamp and bottomland forests that make up the oak-gum-cypress type of the South and the elm-ash-cottonwood type of the North total 49 million acres. This type has long been the mainstay of the southern hardwood timber products industry. In recent years, however, changing land-use patterns have adversely affected this type. Extensive acreages of prime hardwood land have been cleared for agriculture on the alluvial soils of the Mississippi Valley to the extent that some areas of the Delta that once supported extensive acreage of the type are now virtually exclusively agricultural. Those areas remaining forested are stringers along stream bottoms which are too wet to profitably convert to cropland or pasture. At the same time, reservoirs in the South have inundated sites capable of producing sweetgum, tupelo, sycamore, and other preferred hardwood species. Though a boon to bass fishing and other outdoor recreation generally, impoundments usually flood acres that are above average in hardwood-producing capability. Moreover, the result can be fragmentation of timber holdings and increased logging costs.

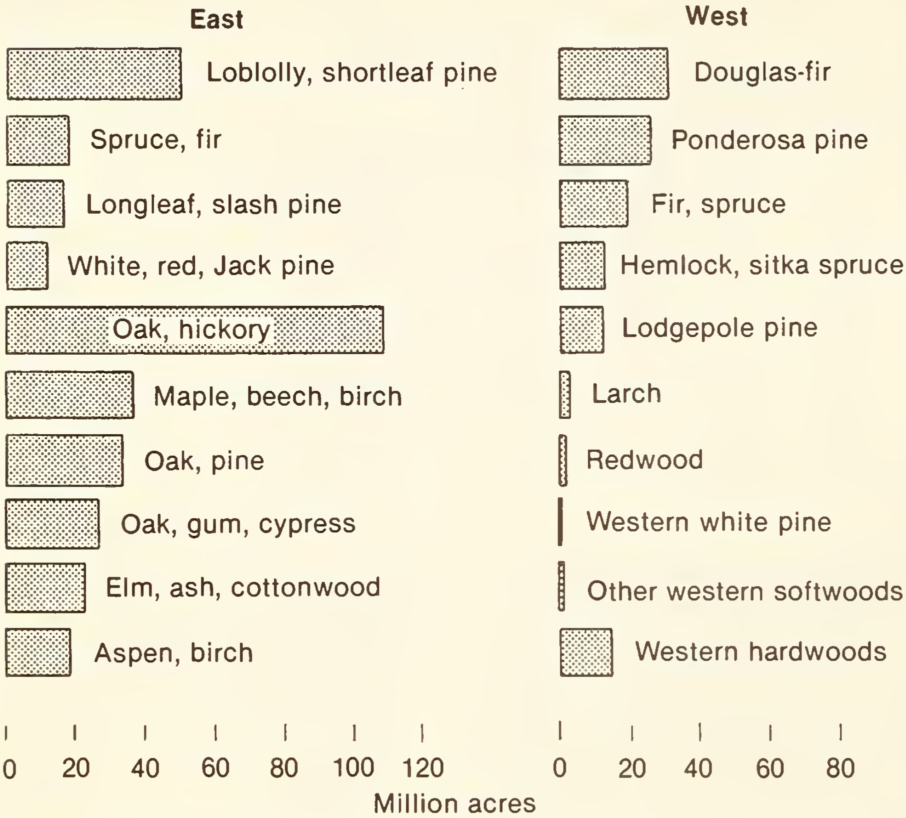
In recent years, there has been a substantial increase in the area of elm-ash-cottonwood of the North, from 18 million acres in 1962 to 22 million in 1977. One important reason for the increase is the propensity of elm-ash-cottonwood to act as pioneer species. On abandoned crop and pasture land, elm-ash-cottonwood is often the first forest type to establish itself, particularly on wet fields and pastures. Another reason for the increase has been the past high-grading of maple-beech-birch stands.

Elm-ash-cottonwood (elm-ash-red maple in many areas) is not one of the most commercially desirable types for timber production. Through most of the North, elm, which is noted for its superior bending qualities, toughness, and strength, is seldom found in commercial quantities or sizes because of the Dutch elm disease. However, ash, particularly white ash, is still much in demand for such products as baseball bats, hockey sticks, tennis rackets, and handles for rakes, hoes, and similar tools. This forest type also provides the bright crimson and yellow fall foliage of the low-lying swamps and meadows in the North.

The maple-beech-birch forest type covers 36 million acres chiefly in the North. This type contains some of the most economically prized hardwood species including sugar maple, yellow birch, white birch, and basswood. It also includes some less desirable species such as red maple and beech. Because of this, most maple-beech-birch stands have been repeatedly high graded and have received little management. As a result, these stands often contain more red maple and beech than would occur in either natural or actively managed stands. They also contain a higher percentage of rough and/or rotten trees than would be found in natural or managed stands.

Figure 6.4

Commercial Timberland Area by Type, 1977



In addition to providing valuable timber products for a wide range of finished products including furniture, fine veneers, tongue depressors, and turned products, the maple-beech-birch forest type provides other resource values. It is primarily this type that is responsible for the profusion of fall color. In many sections of the North, this fall foliage display is a highly valued asset as thousands of tourists travel these areas to enjoy the annual display. Also, because the maple-beech-birch forest type contains a large variety of plant species existing under a variety of conditions, it probably contains a greater variety of wildlife species than any other major forest type in the temperate world.

The remaining eastern hardwood type—aspen-birch—is also concentrated in the northern United States with 15 million of its 19 million acres found in the North Central Region. This forest type is usually a pioneer, i.e., the first species to reforest cleared areas. If ecological succession is not interrupted by fire, logging, or windstorm, this plant community will gradually give way to one of the other types. The reason for this is that the aspen species, and to a lesser degree the birches, are so sunlight demanding that they are incapable of reproducing in shade.

The aspen-birch forests are major sources of pulpwood in the Lake States and some areas in the Northeast. They are also a valuable plant community for many upland and big game wildlife species. Aspen-birch stands provide a highly desirable source of food and shelter for the ruffed grouse. Young seedling-sapling stands are an important source of browse for deer and moose.

The oak-pine forest type covers some 35 million acres of commercial timberland, with the majority occurring in the southern United States. These stands usually result after the harvesting of merchantable pine in mixed pine-hardwood stands. The use of timber stand improvement and artificial regeneration have converted many of these stands to pure pine. Other stands offer similar opportunities. Recent information indicates that, in the absence of treatment, these stands will continue along successional lines and will revert to oak-hickory types.

From 1952 to 1970, the acreage in this type was increasing. Since 1970, however, the acreage has stabilized at around 35 million acres. Changes in techniques preclude direct comparisons; but the relative trends in the area of the oak-pine type are probably indicative of what has been occurring over the last quarter century.

Eastern softwood forests.—In eastern softwood forests, the southern pine types—loblolly-shortleaf and longleaf-slash pine—are the most economically important. These types cover 67 million acres, or nearly 14 percent of the Nation's commercial timberlands. They accounted for 31 percent of the total timber harvest in 1976.

The South's present eminence as a timber-producing region is largely attributable to the loblolly-shortleaf pine forest type. In all, the forest type occupies almost 50 million acres. Loblolly pine can be termed the keystone of the southern pine forest products industry. Except in Florida, where slash pine prevails, it is the dominant pine species in each of the Atlantic and Gulf Coastal States south of New Jersey. It alone accounts for more than half of the total southern pine inventory in the United States.

Although the standing inventory of shortleaf pine is about half that of loblolly, shortleaf is still far more abundant than longleaf and slash combined. The heaviest concentration of shortleaf pine is in the Ouachita Mountains of Arkansas; others are in east Texas and in the Piedmont, especially the Carolinas. Throughout much of the range of occurrence of the loblolly-shortleaf pine type, the two named species often grow in association. But shortleaf pine is also found in commercial quantities well beyond the botanical range of loblolly pine.

Bordering the Atlantic and Gulf Coasts from South Carolina to east Texas is the longleaf-slash pine forest type. All together, there are over 16 million acres in the type, of which two-thirds is concentrated in Florida and Georgia.

Widespread fire control enabled slash pine to invade sites formerly occupied by longleaf, and slash pine has also been extensively planted throughout the forest type. In this type, native forage often grows abundantly beneath timber stands, in natural openings, and on cutover lands, providing feed for substantial numbers of range livestock.

Although changes in stocking standards and inventory procedures make direct historical comparisons impossible, it is apparent that since 1952 the decline in acres of the southern pine types has been rather substantial. While many factors combine to explain this

reduction, two are rather significant. First is the apparent lack of adequate softwood regeneration after harvesting the pine stands. This allows normal succession to continue, which usually results in establishment of an oak-pine or an oak-hickory type. Second, is the decline in the rate of farm abandonment. Until the early 1950's, the reversion of idle farmland to pine stands was responsible for the apparent stability in the acreage of the softwood types.

The spruce-fir and white-red-jack pine forest types account for 6 percent of the Nation's commercial timberlands and are concentrated in the Northeast and North Central regions. While not sharing the national importance of their southern counterparts, these northern softwood types are nonetheless important to local economies. The spruce-fir forest type, which covers 17.6 million acres, is the mainstay of the wood pulp industry in the Northeast as well as in eastern Canada. It also produces such products as spruce studs, whitecedar fencing and siding, maple and birch furniture stock, veneer, and turned products. Because most spruce-fir is located in somewhat remote areas of the region, it is a popular type with recreationists, particularly those who desire a wilderness experience. Spruce-fir usually occurs in the glaciated region which has numerous lakes and streams, many of which are famous for trout, salmon, and other cold water sport fishing. Many of the rivers, such as the Allagash in Maine, provide some of the finest white water canoeing on the continent.

The white-red-jack pine forest type covers 7.3 million acres in the Northeastern subregion and 4.1 million in the North Central. This forest type has three distinct subsystems. In the Northeast, it is usually eastern white pine-eastern hemlock. In the North Central Region, red and jack pine are much more prevalent. If natural succession is permitted to continue, this forest type will eventually evolve to maple-beech-birch or spruce-fir.

Eastern white pine was a mainstay of the softwood lumber industry of the late 1800's and early 1900's. It is still highly prized for its fine working qualities. Red pine is of coarser texture and not as finely machinable as white pine. It is mostly used where rough construction lumber is needed. Jack pine is a relatively small rough tree and is used mainly as a source of softwood pulpwood.

The white-red-jack pine forest type is also significant as wildlife habitat. White-tailed deer and black bear are the most common large mammals in this type. Also, the jack pine subsystem in Michigan' provides suitable nesting habitat for Kirtland's warbler, an endangered species.

Western forests.—In contrast to eastern forests that are dominated by hardwood forest types, softwood species occupy most of the western United States. Nearly 88 percent of the forested acres in the West are stocked with a plurality of softwoods. Because of changes in standards and the addition of 5 million acres that were not included in the 1970 land base, an attempt at meaningful historical or relative comparison cannot be made for the western forest types.

The most commonly occurring western type is Douglas-fir which covers some 31 million acres, a little over 6 percent of the Nation's commercial timberlands. The most extensive concentration of this type occurs on the west side of the Cascade Range in Oregon and Washington. Here Douglas-fir occupies more productive sites, with almost half of these acres capable of producing in excess of 120 cubic feet per acre per year (Append. 3, table 3.6). The Rocky Mountains also contain a significant amount of Douglas-fir, but they are not as productive as those on the Pacific Coast.

Douglas-fir forests cover 31 million acres in the western part of the United States, and are the source of about a quarter of the softwood lumber and half of the softwood plywood produced in the country.

The hemlock-Sitka spruce type, some 12.9 million acres in extent, is found on the western slope of the Coast Range in Oregon and Washington, on the Olympic Peninsula in Washington, and in the Northern Rocky Mountain Region. It is also the dominant coastal type from sea level up to an elevation of 2,000 feet on the islands and along the fiords of the Alexander Archipelago and southeast Alaska.

Together the Douglas-fir and hemlock-Sitka spruce types are one of the Nation's most important sources of timber products. Douglas-fir and hemlock accounted for about a third of the softwood lumber and little over half of the softwood plywood produced in 1977. They comprise a major part of the wood, largely in the form of chips produced from slabs, edging and other by-products of sawmills and veneer mills, used by the wood pulp industry of the Pacific Northwest. These species also comprise by far the largest part of the softwood log exports from the region and are the preferred species in the lumber export trade.

The Douglas-fir and hemlock-Sitka spruce forests also support a rich variety of wildlife; and the streams in the region are used by most of the anadromous salmonids in the contiguous United States. As in other parts of the country, recreational use of these forests is important and has been increasing.

Another western forest type that is fairly widespread is the ponderosa pine type. This type covers almost 27 million acres and accounts for nearly 6 percent of the total commercial timberland base. It occurs mainly east of the summit of the Cascades and in the Rocky Mountains. Ponderosa pine forests are the major source of the high-quality softwood lumber used in the fabrication of millwork. It is also favored for camping, hunting, and hiking, due largely to the open park-like nature of mature stands. In addition, these forests are important to the livestock industry for grazing.

The fir-spruce type totals nearly 20 million acres. It is found at medium to high elevations in most mountain ranges in the West. These forests were for decades of little importance for timber, but were valued as part of the scenic beauty of the high mountains. As the more accessible lower elevation forests have been harvested, the fir forests have been increasingly utilized for timber, and in many areas are now important sources of timber products.

The lodgepole pine forests, with an area of almost 13 million acres, are largely concentrated in Idaho and Montana, western Wyoming, and central Colorado, and along the eastern slopes of the Sierra Nevada and Cascade Mountains. The remaining western soft-

wood forest types, namely western white pine, larch, redwood, and other western softwoods, account for 4 million acres. The western white pine and larch forests are found exclusively in Idaho and Montana. The redwood forests occur only along the California coast. All of these forests are important sources of timber in the areas in which they occur. In the case of the redwood forest, they are also a scenic wonder and recreation resource far out of proportion to the limited area covered.

In addition to the softwood forests, there are about 15 million acres of western hardwoods classified as commercial timberland. In California and southern Oregon, they are largely composed of various species of oak; further North, red alder; and in the Rocky Mountains, aspen. In most areas, the western hardwood type is composed of pioneer species that have come in on disturbed sites that were formerly dominated by conifers. At the present time, they have only limited use as sources of timber products. They are, however, highly valued for wildlife habitat, watershed protection, and in some places, especially in the Rocky Mountains, as scenic resources.

Nonstocked forest areas.—Areas on which the tree cover is not adequate to accurately determine the forest type account for slightly more than 16 million acres. Almost two-thirds of these nonstocked acres are in the eastern United States and usually occur in areas which have recently experienced an extensive harvest. In the West, many of these acres are on adverse sites that are capable of sustaining an established tree cover, but once the tree cover is removed regeneration is quite difficult.

Productivity of Commercial Timberlands. As a result of differences in the factors which determine tree growth, such as soil fertility, climate, elevation, and species characteristics, there are wide differences in the productivity of commercial timberlands as measured by the volume of timber a fully stocked natural stand could produce at culmination of mean annual growth. For analytical and descriptive purposes, commercial timberlands are classified into one of the following productivity classes:

Productivity Class
120 or more cubic feet
85 to 120 cubic feet
50 to 85 cubic feet
20 to 50 cubic feet

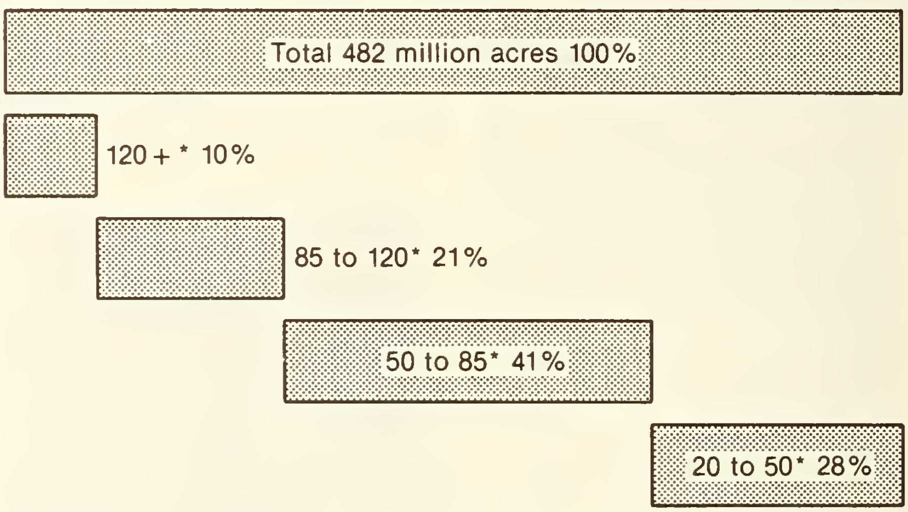
Acres producing less than 20 cubic feet are not classified as commercial timberland.

Less than 10 percent of the Nation's commercial timberland is capable of producing more than 120 cubic feet per acre per year (table 6.5, fig. 6.5; Append. 3, tables 3.5 and 3.6). Nearly half of these acres are on the Pacific Coast and are concentrated on the west side of the Cascade Range in the Douglas-fir, hemlock-Sitka spruce, and western hardwood types. About one-fourth of these acres are in the South, most of which occur in the loblolly shortleaf pine. oak-pine, and oak-gum-cypress forest types.

Slightly more than one-fifth, or 99 million acres, of commercial timberland is capable of producing from 85 to 120 cubic feet. About 48 percent of this area is in the South. Although most of this area is in the southern pine, oak-pine and oak-gum-cypress types, there are also substantial acreages in the oak-hickory type. Another 29 percent of the area in the 85 to 120 productivity class is in the North, chiefly the oak-hickory, maple-birch-beech, and elm-ash-cottonwood types. Most of the remaining area

Figure 6.5

Commercial Timberland Area by Productivity Class, 1977



*Annual growth in cubic feet per acre

Table 6.5—*Area of commercial timberland in the United States, by section and productivity class, 1977*

Productivity class (cubic feet per acre/per year)	Total United States		North		South		Rocky Mountain		Pacific Coast	
	Area	Proportion	Area	Proportion	Area	Proportion	Area	Proportion	Area	Proportion
	Million acres	*Percent*	*Million acres*	*Percent*	*Million acres*	*Percent*	*Million acres*	*Percent*	*Million acres*	*Percent*
120 or more	47.3	9.8	9.2	5.5	12.7	6.8	3.5	6.1	21.9	31.1
85 to 120	98.9	20.5	28.9	17.4	47.9	25.5	7.5	13.0	14.6	20.7
50 to 85	200.1	41.5	62.5	37.6	98.3	52.2	16.2	28.0	23.1	32.8
20 to 50	136.1	28.2	65.5	39.5	29.2	15.5	30.6	52.9	10.9	15.4
All classes	482.5	100.0	166.1	100.0	188.0	100.0	57.8	100.0	70.5	100.0

Note: Data may not add to totals because of rounding.

in the 85 to 120 class was distributed among the forest types in the Pacific Coast section.

A little more than two-fifths of the Nation's timberlands are in the 50 to 85 cubic feet productivity class. Nearly half of these acres are in the South, about a third in the North and one-fifth in the West. In the eastern section, the largest area in the 50 to 85 productivity class was in the oak-hickory type. There were also large areas in southern pine and oak-pine types. In the West, all of the major forest types had significant acreages in this class.

The remaining area with 20 to 50 cubic foot growth potential makes up more than a quarter of all commercial timberlands. This class of land provides limited response to timber management activities but often yields important values for grazing, recreation, or other nontimber uses. In the East, these poorer lands are mostly in oak-hickory and the maple-beech-birch types found in the hilly and mountainous areas such as the Appalachians and the Ozarks. In the Rocky Mountains, this site class makes up about half of that section's commercial timberland.

In the eastern sections, the area in the high productivity classes—85 cubic feet and above—is heavily concentrated in private ownerships (Append. 3, table 3.5). In the western sections, it is more evenly spread.

Generally speaking, each productivity class declined in acreage between 1970 and 1977. The exception was the 50 to 85 cubic foot class where a substantial gain was realized. With the exception of the North, all sections had increases in these areas with the largest gains occurring in the South.

Stand-Size Class. The size of the stand on commercial timberland is indicative of availability of timber for various timber products and is a basic factor in planning timber management activities. Stand-size class is determined by the predominate size of trees stocking a stand. Stands are classified as sawtimber stands, poletimber stands, and seedlings and saplings.

In 1977, 216 million acres—45 percent of commercial timberlands—were classified as sawtimber size stands (table 6.6, fig. 6.6; Appendix 3, table 3.7). Slightly more than three-fifths of these acres are in the eastern sections. Most of these stands are young growth, and 87 percent are privately owned. In the Pacific Coast section, on the other hand, many of the 47 million acres of sawtimber stands are in old growth stands, with extremely high volume per acre, and more than half occur in National Forests. Most of the 39 million acres of sawtimber stands in the Rocky Mountain States are also old growth stands in the National Forests. The volumes per acre in these stands are much below those on the Pacific Coast.

Since 1970, the acreage in sawtimber stands has declined. Most of this decline occurred in the South and resulted primarily from a combination of harvesting, and the associated change in stand-size class; clearing for pasture and cropland; and urban expansion. Acreage in the other sections of the country remained virtually unchanged.

As with sawtimber, most of the Nation's poletimber size stands occur in the eastern section, where they are about equally divided between the North and the South. Less than one-fifth of these stands occur in the West, and here, too, the distribution between Pacific Coast and the Rocky Mountains is about equal. Poletimber stands showed a net gain of 11 million acres between 1970 and 1977 with most of the increase in the South. These stands also increased in the Pacific Coast section.

About one-fourth of the Nation's timberlands are classed as seedling and sapling stands. Here again, these stands occur primarily in the eastern United

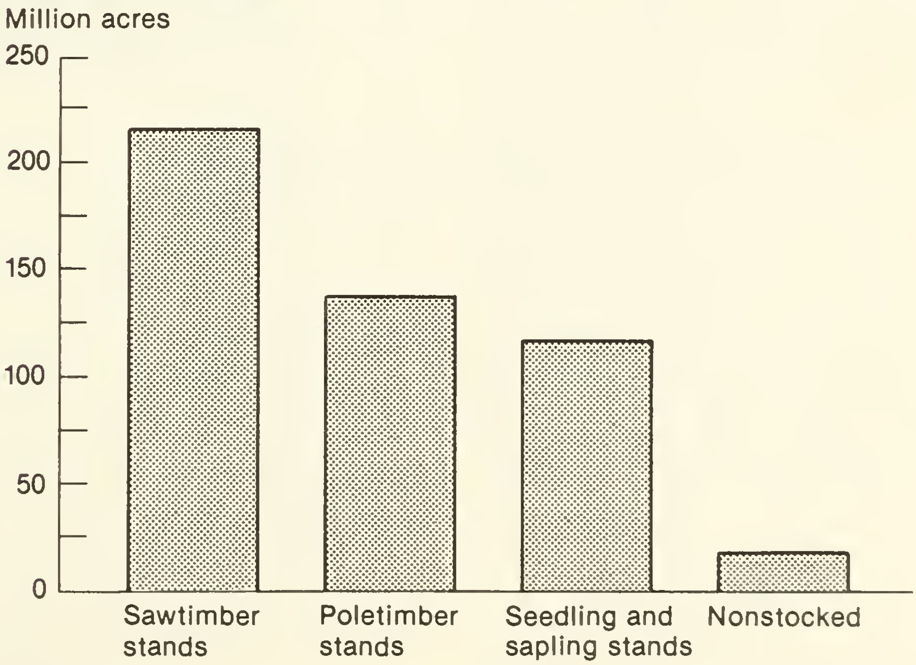
Table 6.6—*Area of commercial timberland in the United States, by section and stand-size class, 1977*

Stand-size class	Total United States: Area	Total United States: Proportion	North	South	Rocky Mountain	Pacific Coast
	Million acres	*Percent*	*Million acres*	*Million acres*	*Million acres*	*Million acres*
Sawtimber stands	215.4	44.7	59.1	71.2	38.5	46.5
Poletimber stands	135.6	28.1	55.5	58.3	11.7	10.0
Seedling and sapling stands	115.0	23.8	46.7	53.3	5.0	10.1
Nonstocked areas	16.4	3.4	4.8	5.2	2.6	3.8
All classes	482.5	100.0	166.1	188.0	57.8	70.5

Note: Data may not add to totals because of rounding.

Figure 6.6

Commercial Timberland Area by Stand-Size Class, 1977



States—only about 13 percent of the area in these stands occurs west of the Great Plains.

The growth in the acreage of poletimber stands has been roughly offset by a decline in the area of seedling and sapling stands. Thus it apparently reflects the natural maturing of forests.

The remaining 16 million acres of commercial timberlands are nonstocked. About three-fifths of this nonstocked area is in the East with about 4.8 million acres in the North and 5.2 million in the South. Most of the remaining nonstocked area is in the Pacific Coast section. Nonstocked acreages have undergone about a 20-percent reduction since 1970.

Timber Inventory

During the next few decades, the Nation's domestic supplies of timber must come from trees now standing on commercial timberlands. The volume, species composition, location, quality and ownership of this timber is thus of major importance in appraising the present and prospective timber situation.

Total Timber Volumes. The commercial timberlands in the United States contained nearly 792 billion cubic feet of sound wood in 1977 (table 6.7, fig. 6.7; Append. 3, table 3.8). About 64 percent was in sawtimber trees and 26 percent in poletimber trees—collectively defined as growing stock. The remainder was made up of salvable dead, rough, and rotten trees. Salvable dead trees are trees that have been killed by fire, insects, or disease but are still usable. Rough trees are trees that because of excessive sweep or crook do not contain a usable sawlog or, if less than sawlog size, hold no prospect of ever containing a sawlog. Rotten trees are those that contain too much rot to be classified as growing stock. Although some of the dead, rough and rotten trees are suitable for lumber and veneer, most of it is usable only for pulp, fuelwood, or other products where log quality is not a significant factor.

Softwood Inventories. Softwoods predominate in the timber inventory, composing about 61 percent of the total volume of all classes of timber and two-thirds of the growing stock—sawtimber and poletimber trees. Nearly half of the softwood growing stock inventory and 59 percent of the sawtimber inventory was in the Pacific Coast section (table 6.8, fig. 6.8; Append. 3, tables 3.9 and 3.11). This is in sharp contrast to the distribution of commercial timberland, which is predominantly in the eastern sections. It reflects the concentration of old growth stands with high volumes per acre. Most of the remaining softwood timber—growing stock and sawtimber—is in the South and Rocky Mountains.

About 26 percent of the Nation's softwood sawtimber inventory in 1977 was Douglas-fir—the Nation's most important softwood species (table 6.9). Three-fifths of this Douglas-fir inventory was located in western Washington and western Oregon (Append. 3, table 3.18).

Western hemlock, true firs, ponderosa pine, and other western softwoods composed another 52 percent

Table 6.7—*Net volume of timber on commercial timberland in the United States, by softwoods and hardwoods and class of timber, 1977*

Class of timber	All species		Softwoods			Hardwoods
	Volume	Proportion	Total	Eastern	Western	
	Million cubic feet	*Percent*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*	*Million cubic feet*
Sawtimber trees						
Saw-log portion	452,786	57.1	341,904	82,112	259,791	110,882
Upper-stem portion	52,042	6.6	25,917	10,347	15,571	26,125
Total	504,828	63.7	367,821	92,459	275,362	137,007
Poletimber trees	206,140	26.0	87,958	49,251	38,707	118,182
Total growing stock	710,968	89.7	455,779	141,710	314,069	255,189
Savable dead trees	14,114	1.8	13,197	277	12,920	916
Rough trees	44,042	5.6	7,396	4,566	2,830	36,646
Rotten trees	23,247	2.9	8,261	1,517	6,744	14,987
All classes	792,371	100.0	484,633	148,070	336,563	307,738

Note: Data may not add to totals because of rounding.

Figure 6.7

Timber Inventory by Class of Timber, 1977

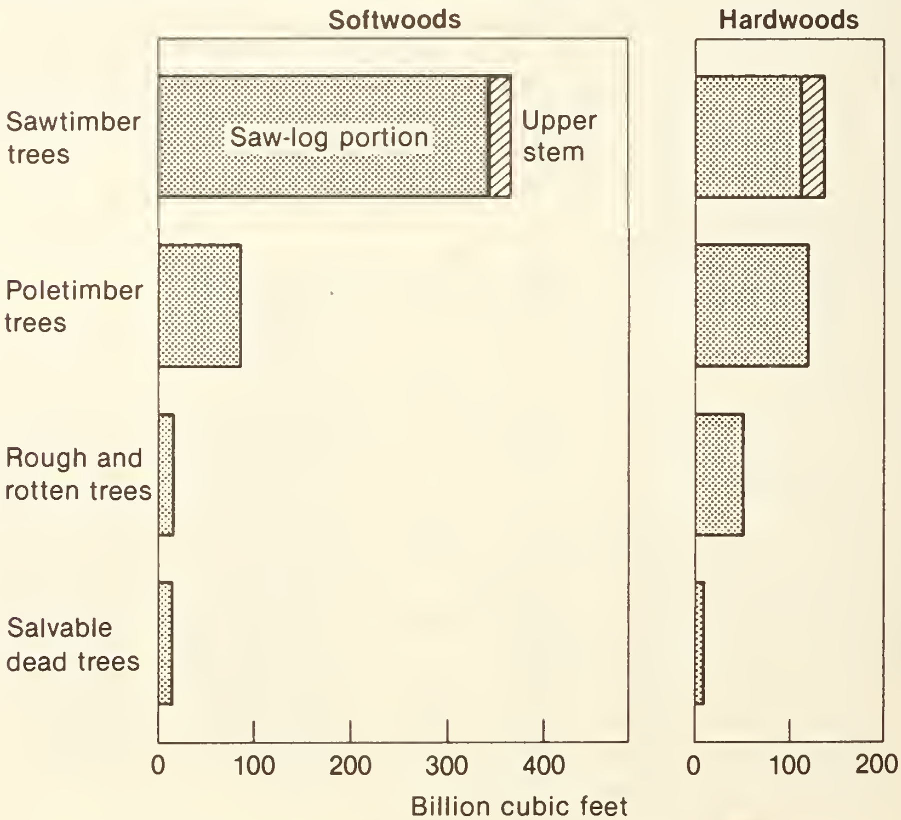


Table 6.8—*Net volume of growing stock and sawtimber on commercial timberland in the United States, by softwoods and hardwoods and section, 1977*

GROWING STOCK

Section	All species		Softwoods		Hardwoods	
	Volume	Proportion	Volume	Proportion	Volume	Proportion
	Million cubic feet	*Percent*	*Million cubic feet*	*Percent*	*Million cubic feet*	*Percent*
North	173,145	24.4	44,574	9.8	128,571	50.4
South	202,009	28.4	97,136	21.3	104,873	41.1
Rocky Mountain	99,814	14.0	94,935	20.8	4,879	1.9
Pacific Coast	236,000	33.2	219,134	48.1	16,866	6.6
United States	710,968	100.0	455,779	100.0	255,189	100.0

SAWTIMBER

Section	All species		Softwoods		Hardwoods	
	Million board feet[1]	*Percent*	*Million board feet*[1]	*Percent*	*Million board feet*[1]	*Percent*
North	359,021	13.9	96,504	4.9	262,517	44.2
South	614,709	23.9	341,023	17.1	273,686	46.1
Rocky Mountain	390,169	15.1	380,380	19.2	9,790	1.7
Pacific Coast	1,215,042	47.1	1,167,503	58.8	47,539	8.0
United States	2,578,940	100.0	1,985,408	100.0	593,532	100.0

[1]International ¼-inch log rule.

Note: Data may not add to totals because of rounding.

of the softwood sawtimber inventory. About three-quarters of the inventory of these species was in the Pacific Coast States and mostly in Oregon and Washington. In terms of volume, Douglas-fir, ponderosa pine and the spruces are the most important species in the Rocky Mountains.

Over three-fifths of the softwood timber in the Pacific Coast section is in trees 19 inches or larger in diameter at breast height (Append. 3, tables 3.19 and 3.21). For some species such as Douglas-fir and ponderosa pine, the proportion of the volume in these large diameter trees is even greater (Append. 3, tables 3.27 and 3.28). In general, the softwood timber in the Rocky Mountains is smaller. Only a little over a fourth of the volume is in trees larger than 19 inches in diameter at breast height—over two-fifths is in trees from 9 to 17 inches.

Collectively, the western softwoods provided about two-thirds of the logs used in the manufacture of softwood plywood in 1977, and 69 percent of the logs used for softwood lumber. This was, of course, related to the concentration of softwood inventories in the West and the predominance of relatively large-size, high-quality trees.

There has been some decline in the relative importance of western softwoods as sources of timber products in recent years. As indicated in following sections of this study, further and substantial changes are in prospect. Inevitably, as old-growth stands are harvested, the geographical distribution of timber inventories and available harvests will of necessity conform more and more closely to the distribution of commercial timberlands.

Eastern softwoods, mainly southern pines, made up 20 percent of the Nation's growing stock in 1977, and about 17 percent of softwood sawtimber volumes. Nearly all of the southern pine is in the South (Append. 3, tables 3.13 and 3.15). With the exception of cypress, which is also in the South, the inventories of other eastern softwoods are in the North. Spruce, balsam fir, and eastern white and red pines account for most of the volume.

Most southern pine timber in 1977 was relatively small, with four-fifths of the total inventory in trees less than 15 inches in diameter (Append. 3, tables 3.23 and 3.25). Nonetheless, the South was the source of about a quarter of the softwood lumber, two-fifths of the softwood plywood, and three-fifths of the softwood pulpwood produced in 1977. Inventories of fir, white and red pine, hemlock, cypress, and other eastern softwoods also were concentrated in the smaller sizes (Append. 3, tables 3.23 and 3.25).

Hardwood Inventories. Hardwoods made up about 39 percent of all classes of standing timber in 1977, and about 27 percent of all sawtimber (table 6.7). A little more than half of all hardwood growing stock was in the North (table 6.8, fig. 6.8). Another 41 percent was in the South and the remainder in the West, chiefly in the Pacific Coast section.

Two-fifths of the hardwood sawtimber volumes in 1977—232 billion board feet was in select species—that is, select white and read oaks,[3] hard maple, yellow birch, sweetgum, yellow-popular, ash, black walnut, and black cherry (table 6.9). These are the species preferred for cabinet work, paneling, furniture, and other uses where quality and/or surface appearance are important considerations.

The remainder of the hardwood sawtimber, about 361 billion board feet, was composed of upland oaks, hickory, beech, cottonwood, and various other species that have more limited potential for high-quality hardwoods products. However, most of this timber is suitable for the manufacture of products such as railroad ties, pallet lumber, and construction timber.

Only 11 percent of the hardwood growing stock volume in 1977 was in trees 19 inches and larger in diameter at breast height (table 6.10). This limited supply of larger timber further limits suitability of hardwood timber for products where quality is important.

Another 42 percent of the growing stock inventory was between 11 and 19 inches in diameter—trees large enough for the manufacture of common grades of lumber and products such as ties and timbers. Trees 5 to 11 inches in diameter made up nearly half of the inventory.

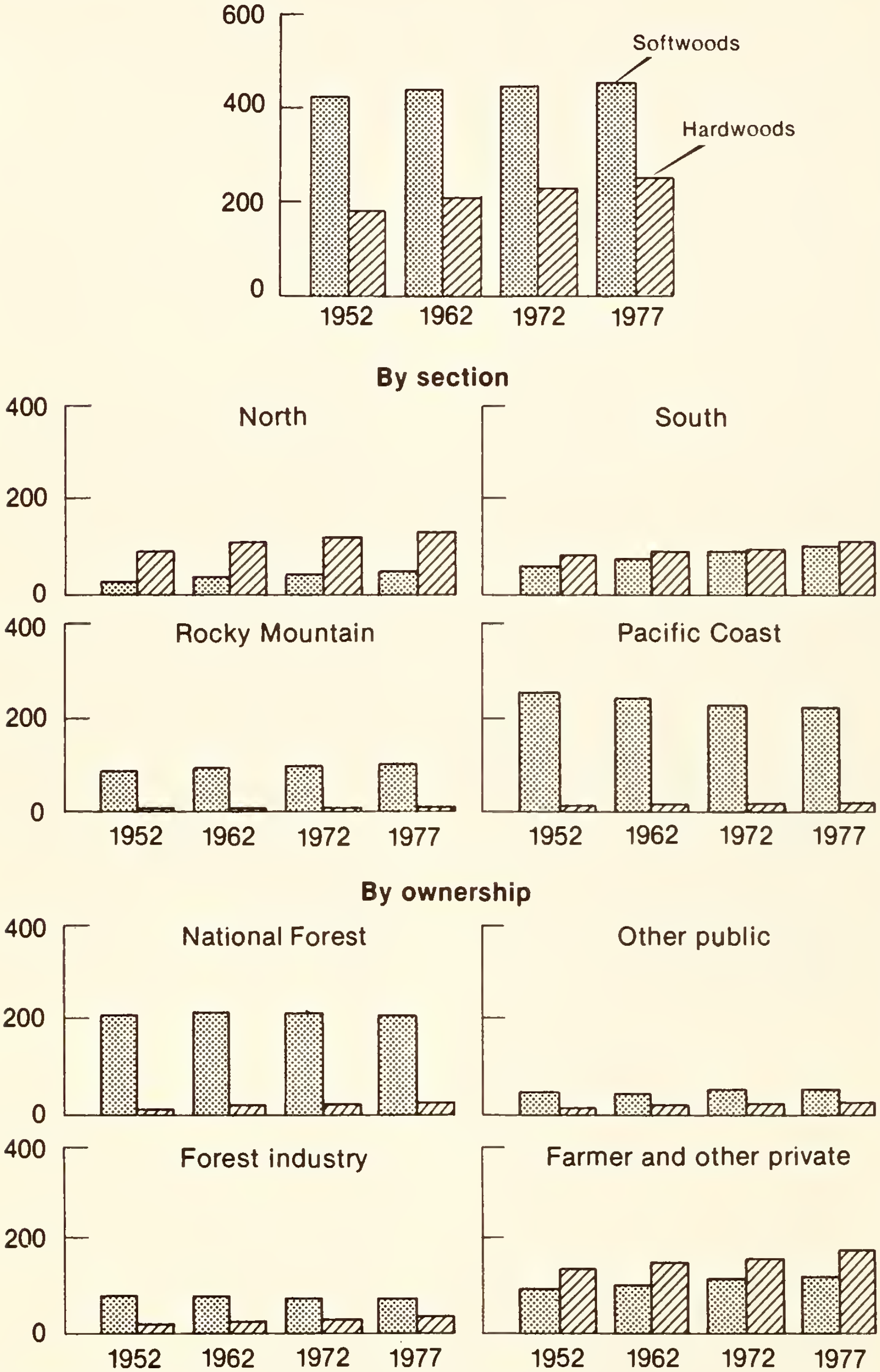
Ownership of Timber Inventories. The ownership of timber inventories is very unevenly distributed. The largest portion of the softwood timber inventory in 1977 was in National Forests, including some 46 percent of all softwood growing stock and 51 percent of all softwood sawtimber (table 6.11, fig. 6.8). Most of these timber volumes were in old-growth stands in the West, with a major part in areas still lacking access roads. Only 8 percent of all hardwood growing stock was in National Forests.

[3] Select white oaks include *Quercus alba, Q. michauxii, Q. muehlenbergii, Q. durandii, Q. bicolor,* and *Q. macrocarpa.* Select red oaks include *Q. rubra, Q. falcata* var. *pagodifolia,* and *Q. shumardii.*

Figure 6.8

Growing Stock Inventory Trends, 1952-77

Billion cubic feet



Farmer and other private ownerships contained the major part of the Nation's inventory of hardwoods—about 70 percent—and a substantial part of all softwood inventories—about 27 percent. The bulk of the timber in these ownerships is in the eastern sections. As a result, nearly all of it is readily accessible from existing road systems and is relatively close to most of the large timber markets.

Forest industries in 1977 held about 16 percent of all softwood inventories, and a somewhat smaller proportion of hardwoods. Wood-using plants in the East thus must look to nonindustrial private ownerships for much of their timber supply, while many western firms must depend on National Forest and other public lands for much of their log requirements.

Public ownerships other than National Forests held roughly 10 percent of all timber inventories in 1977. These inventories were of particular importance in the Pacific Northwest and the Lake States—where such ownerships are concentrated.

Trends in Timber Inventories. Despite the fact that the area of commercial timberland declined more than 2 percent between 1970 and 1977, the growing stock inventory increased by 5 percent or 30.5 billion cubic feet (table 6.12, fig. 6.8). This increase was nearly identical to the increase during the 8-year period of 1962–70. It was also a continuation of a trend that has been rising since 1952, the first year for which comparable inventory data are available.

There have been some significant differences in the rates of increase in softwood and hardwood inventories. In the 1952–77 period, softwood inventories rose 7 percent compared to 43 percent for hardwoods. Sawtimber inventories have roughly followed the growing stock trends.

The increase in inventories has been almost entirely on the young stands in the North and South. Inventories have decreased substantially on the Pacific Coast, a natural and expected result of the harvesting of the old-growth stands of that section. Timber inventories in the Rocky Mountains, where harvests are at a relatively low level, have not changed much since 1952.

There have been important differences in the trends in inventories by diameter class (fig. 6.9). In the eastern sections, there were increases in the inventories for softwoods and hardwoods in all diameter classes including those above 29 inches (Append. 3, tables 3.19, 3.20, 3.21, and 3.22). However, the bulk of the increase in volume was in the smaller diameter classes—that in the 5.0 to 6.9 inch class rose by 63 percent. As a result, an increasing proportion of the inventory has been in the smaller trees.

The rise in inventories in the eastern section is the result of a number of factors. In general, however, as indicated in other places in this study, they reflect in part the success of public and private forest policies and programs

Table 6.9—*Net volume of growing stock and sawtimber on commercial timberland in the United States, by species, 1977*

Species	Growing stock Volume	Growing stock Proportion	Sawtimber Volume	Sawtimber Proportion
	Million cubic feet	*Percent*	*Million board feet*[1]	*Percent*
Eastern softwoods				
Southern pines	92,624	13.0	321,563	12.5
Spruce and fir	18,969	2.7	26,933	1.0
White and red pines	10,735	1.5	35,622	1.4
Cypress	5,459	.8	19,494	.8
Other	13,924	1.9	33,914	1.3
Total	141,710	19.9	437,526	17.0
Eastern hardwoods				
Select white and red oaks	38,785	5.5	102,346	4.0
Other oaks	47,904	6.7	121,241	4.7
Hickory	14,764	2.1	33,645	1.3
Hard maple	13,658	1.9	28,792	1.1
Ash, walnut, and black cherry	13,587	1.9	26,868	1.0
Sweetgum	13,650	1.9	32,461	1.3
Yellow-poplar	11,770	1.7	34,111	1.3
Yellow birch	3,366	.5	7,628	.3
Other	75,960	10.7	149,111	5.8
Total	233,444	32.9	536,203	20.8
Total eastern	375,154	52.8	973,729	37.8
Western softwoods				
Douglas-fir	93,502	13.2	514,317	19.9
Western hemlock	51,358	7.2	256,924	10.0
True firs	43,496	6.1	214,540	8.3
Ponderosa and Jeffrey pines	38,083	5.4	192,070	7.4
Spruce	26,790	3.8	128,951	5.0
Lodgepole pine	26,422	3.7	71,435	2.8
White and sugar pines	7,420	1.0	41,780	1.6
Redwood	4,393	.6	22,007	.9
Other	22,606	3.2	105,859	4.1
Total	314,069	44.2	1,547,882	60.0
Western hardwoods	21,745	3.0	57,329	2.2
Total western	335,814	47.2	1,605,211	62.2
All species	710,968	100.0	2,578,940	100.0

[1]International ¼-inch log rule.

Note: Data may not add to totals because of rounding.

designed to improve the timber situation.

The trends may also be attributed in part to the level of demand, and changes in stand-size class. The overall demand for timber remained relatively constant from the late 1940's through the early 1960's for softwoods, and until 1977 for hardwoods. During this same period, much of the eastern forest region was recovering from the intensive, and often devastating, logging of the late 19th and early 20th centuries. During the last 25 years, many of the second growth stands that came in on abandoned crop and pasture land and the cutover lands of the Lake States and mid-South grew from seedling and sapling to poletimber and sawtimber size.

In both the Pacific Coast and Rocky Mountain sections, there were large declines (about a third since 1952) in the softwood inventories above 29 inches. At the same time, there were large increases in the smaller diameter classes, and particularly those under 15 inches, and of hardwoods, as young forests replaced the old-growth stands that were harvested. The rapid decline in the large-size, high-quality softwood inventories in the West has some important implications for the timber industries and for consumers. It means, for example, that in a relatively short time industry must shift to different quality characteristics. Consumers, including the importers of high-quality logs and lumber in Japan and western Europe, face a similar future and must shift to other sources of supply or make other changes to adjust to the smaller, poorer-quality timber which will be available.

Additional Fiber. The above discussion has been concerned with the timber inventories included in the present survey of timber resources. There are additional and substantial volumes of fiber that are not included in these inventories. These are described in the following paragraphs.

Saplings.—Although saplings, trees 1.0 to 4.9 inches d.b.h., are counted in forest surveys, the volume in such trees is not computed. Assuming saplings (on the average) contain 1 cubic foot, there were an estimated 256.3 billion cubic feet in saplings in 1977. Of this, 90.6 billion cubic feet were in softwoods and 165.7 billion were in hardwoods.

Most of this material is not usable presently or potentially. A high proportion represents the trees which will compose the next stand of commercial timber. Beyond this, many of the stems that eventually are suppressed and die act as trainers for those that do survive. Thus, under normal rotation harvesting, only those trees that are severely suppressed or serve no useful purpose in the stand should be considered available for use.

In some instances, particularly where the crop is wood fiber and where hardwood sprouting is vigorous, silage forestry may be a practical possibility. With this system, sapling stands are literally mowed down and chipped at frequent intervals. Such systems can produce a higher total yield of fiber than conventional management systems over an equivalent period of time.

Tops, limbs, stumps.—A considerable volume of wood usable for pulping, fuel and other similar purposes exists in what is termed the nongrowing stock portion of the tree. It has been estimated, for example, that about 40 percent of the total fiber in a tree occurs in the top, limbs, bark and foliage.[4] Little use is being made of such material at the present time because with existing technology and with current costs of fiber from other sources it is not economically feasible. This material does, however, represent a large potential source of fiber for pulp, fuel, and the production of various petrochemical substitutes.

Impacts from Destructive Agents

Timber inventories are affected on a continuing basis by losses from vegetative competition, and insects, diseases,

[4] Wahlgren, H. Gus, and Thomas H. Ellis. Potential resource availability with whole-tree utilization. TAPPI 61(11). November 1978.

Table 6.10—*Net volume of growing stock on commercial timberland in the United States, by diameter class and species, 1977*

(Million cubic feet)

Species	All diameters	5.0–8.9 inches	9.0–10.9 inches	11.0–14.9 inches	15.0–18.9 inches	19.0–28.9 inches	29.0 inches and larger
Eastern softwoods							
Southern pines	92,624	27,125	17,435	28,135	13,727	6,028	174
Spruce and fir	18,969	11,933	3,419	2,723	728	165	1
White and red pines	10,735	2,952	1,429	2,638	1,998	1,530	189
Cypress	5,459	1,199	741	1,531	1,057	767	163
Other	13,924	6,042	2,512	3,183	1,337	784	66
Total	141,710	49,251	25,536	38,211	18,846	9,274	593
Eastern hardwoods							
Select white and red oaks	38,785	8,885	5,930	10,967	7,272	5,141	591
Other oaks	47,904	12,160	7,601	13,139	8,332	5,832	840
Hickory	14,764	4,354	2,629	4,196	2,204	1,257	124
Hard maple	13,658	4,739	2,318	3,397	1,955	1,182	69
Ash, walnut, and black cherry	13,587	4,436	2,475	3,862	1,883	889	43
Sweetgum	13,650	4,091	2,323	3,897	2,134	1,132	74
Yellow-poplar	11,770	2,170	1,647	3,806	2,590	1,449	109
Yellow birch	3,366	1,051	550	915	510	318	24
Other	75,960	27,149	14,000	18,895	9,429	5,818	669
Total	233,444	69,035	39,471	63,073	36,308	23,016	2,541
Total eastern	375,154	118,286	65,007	101,284	55,154	32,290	3,134
Western softwoods							
Douglas-fir	93,502	7,866	5,452	12,647	12,474	22,714	32,349
Western hemlock	51,358	3,500	2,739	6,965	7,716	17,045	13,394
True firs	43,496	5,863	3,633	7,006	6,295	10,916	9,784
Ponderosa and Jeffrey pines	38,083	3,336	2,324	5,556	5,821	12,301	8,746
Spruce	26,790	2,792	2,143	4,753	4,330	6,799	5,974
Lodgepole pine	26,422	12,121	5,448	6,061	1,852	785	155
White and sugar pines	7,420	340	291	750	818	2,032	3,189
Redwood	4,393	84	91	306	502	1,240	2,170
Other	22,606	2,806	1,767	3,697	3,411	5,896	5,029
Total	314,069	38,707	23,886	47,741	43,217	79,728	80,789
Western hardwoods	21,745	6,229	3,447	5,317	3,060	2,889	803
Total western	335,814	44,936	27,333	53,057	46,277	82,617	81,593
All species	710,968	163,222	92,340	154,341	101,431	114,907	84,727

Note: Data may not add to totals because of rounding.

Table 6.11—*Net volume of growing stock and sawtimber on commercial timberland in the United States, by softwoods and hardwoods and ownership, 1977*

GROWING STOCK

Ownership	All species		Softwoods		Hardwoods	
	Volume	Proportion	Volume	Proportion	Volume	Proportion
	Million cubic feet	*Percent*	*Million cubic feet*	*Percent*	*Million cubic feet*	*Percent*
National Forest	228,450	32.1	207,699	45.6	20,751	8.1
Other public	75,503	10.6	50,946	11.2	24,557	9.6
Forest industry	106,266	15.0	74,382	16.3	31,884	12.5
Farmer and other private	300,750	42.3	122,753	26.9	177,997	69.8
All ownerships	710,968	100.0	455,779	100.0	255,189	100.0

SAWTIMBER

Ownership	All species		Softwoods		Hardwoods	
	Million board feet[1]	*Percent*	*Million board feet*[1]	*Percent*	*Million board feet*[1]	*Percent*
National Forest	1,058,386	41.0	1,009,287	50.8	49,099	8.3
Other public	286,099	11.1	235,174	11.9	50,925	8.6
Forest industry	394,924	15.3	314,276	15.8	80,649	13.6
Farmer and other private	839,530	32.6	426,671	21.5	412,859	69.5
All ownerships	2,578,940	100.0	1,985,408	100.0	593,532	100.0

[1]International ¼-inch log rule.

Note: Data may not add to totals because of rounding.

fire, storms, and other destructive agents. Such impacts are measured by the statistics on mortality, that is, the volume of growing stock trees 5 inches and larger in diameter dying from natural causes during a given period of time.

Competition is the major cause of mortality. However, destructive agents also cause large losses. For example, losses from bark beetles in old-growth stands of ponderosa pine, Douglas-fir, and other western species have been substantial. The mountain pine beetle has been a serious problem in the Rocky Mountain area for many years, having destroyed billions of board feet of lodgepole pine and ponderosa pine. Outbreaks of bark beetles in the South have also caused significant mortality in some years.

Some leading diseases causing mortality are root rots, blister rust (white pine), fusiform rust, and Dutch elm disease.

Although losses from fire and storms tend to be spectacular, they do

not account, on the average, for a very large part of the total mortality.

Volume of Mortality. The annual mortality losses from natural causes—competition, insects, disease, fire, storms, and other destructive agents—were estimated at about 4 billion cubic feet of growing stock in 1976 (table 6.13). Mortality of sawtimber amounted to an estimated 12 billion board feet. About 2.3 billion cubic feet of growing stock mortality and nearly three-quarters of sawtimber mortality was in softwood species.

Most softwood mortality in 1976 was in the western United States, chiefly in the Pacific Coast region (fig. 6.10; Append. 3, tables 3.31 and 3.32). The Douglas-fir region suffered heavier mortality than any other region, 0.5 billion cubic feet of growing stock and 2.6 billion board feet of sawtimber. This distribution is related to the concentration of timber volumes in this area and the high proportion of overmature timber characteristic of old-growth stands. Much of the sawtimber loss was in trees containing large proportions of high-quality material.

Mortality losses from natural causes—competition, insects, disease, fire, storms and other destructive agents—amount to about 4 billion cubic feet annually.

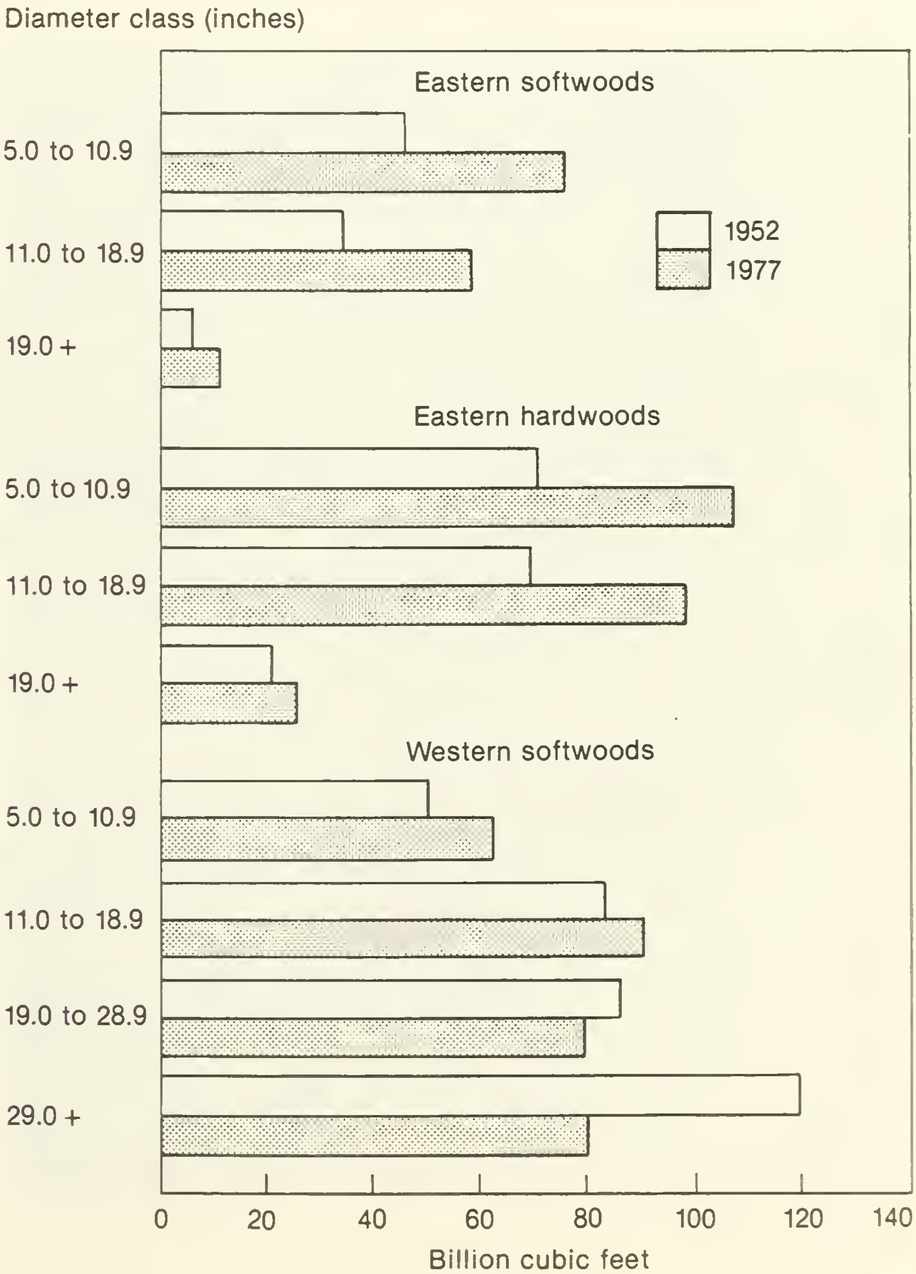
Timber mortality on National Forests amounted to 1 billion cubic feet of growing stock, including 4.4 billion board feet of sawtimber. The bulk of this material was softwood. In fact, nearly half of the softwood sawtimber mortality occurred on National Forests. The primary cause of death was insect infestation and drought. While representing a significant volume—equivalent to slightly more than one-third of the 1976 softwood removal from Forest Service lands,—most of the mortality on the National Forests occurs in areas which are unroaded and inaccessible for trucks and tractors. Moreover, the occurrence of mortality is usually scattered over large acreages, which precludes economic treatment. At this time, with the existing technology, the location of processing plants, and current product prices, salvage of the mortality on National Forests is not economically feasible in most stands, including those in roaded areas.

Although the potential is limited, part of the annual mortality on the National Forests and other ownerships is salvaged. This salvage amounted to an estimated 225 million cubic feet of dead softwood timber and 55 million cubic feet of dead hardwood timber in 1976. This represented 10 percent of the total mortality of softwood and 3 percent of hardwood mortality.

In the past, much of the timber salvaged has been damaged by major catastrophes such as storms or fires. The concentration of large volumes resulting from such catastrophes usually

Figure 6.9

Timber Inventory by Diameter Class, 1952 and 1977



makes salvage economically feasible. As on the National Forests, most of the scattered endemic mortality can only be harvested economically during harvesting or commercial thinning operations.

Additional Losses from Destructive Agents. The impact of destructive agents is not limited to just the loss of growing stock described above. These agents kill trees under 5 inches in diameter, destroy seed crops and seedlings, inhibit height and diameter growth, reduce the quality and utility of volume, and even change the stand composition from preferred to least desirable species.

Much of the damage done by insects and diseases has the effect of either extending the time required to grow trees to a merchantable size or reducing the utility and quality of the wood produced. Insects such as shoot and tip moths and diseases such as dwarf mistletoe stunt young trees and slow the growth rate. Defoliating insects reduce growth as well as kill trees.

In some cases, insects, diseases, and wind cause deformities which limit usable yields of timber. Crooking and forking in hardwood species caused by insects or disease reduce usable tree volumes, and tree borers cause significant degrade and loss of value in some species.

Methods and data are not yet available to fully assess the varied impacts of these noncatastrophic agents. But although they are not as visible as a burn or a blowdown, they do reduce growth rates and are a significant contributing factor to mortality.

There are a variety of ways of reducing and controlling the losses from various destructive agents. These include cultural practices such as thinning and the selection of resistant species for planting. Chemicals to control insects and disease have also been widely used. But in recent years, the growing constraints on such use, because of the need to protect other organisms and the natural enivronment in general, are making such controls both expensive and difficult to carry out.

Much of the loss in the West from destructive agents will, of course, stop when the old-growth forests are harvested. However, this is likely to be more than offset by additional mortality in young stands associated with the increasing inventory and basal areas (overcrowding) which seem to be in prospect. Thus, more intensive management, including spacing control, and new technology on the natural control of destructive agents are the best hope of reducing losses.

The impact of destructive agents is not limited to mortality of growing stock. These agents also kill trees under 5 inches in diameter, destroy seed crops and seedlings, and inhibit height and diameter growth.

Timber Growth

Net annual growth (total annual growth less mortality and cull increment) is, in general, an indicator of the present productivity of timber resources. In the eastern sections where there are young growth forests, it is also an indicator of the volume of timber available for harvest.[5] In the West, however, where mortality in old-growth stands offsets much of the growth, the existing inventory of standing timber is the primary determinant of allowable harvests.

Net Annual Timber Growth. In 1976, net annual growth on growing stock was 22 billion cubic feet including 75 billion board feet of sawtimber (table 6.14). There were substantial volumes of net annual growth in all regions and sections of the country. However, more than half of the net annual growth was in the timber stands in the South. This is to be expected since most stands in that section are relatively young and vigorous and the area in commercial timberland is large. In the West, mortality in the old-growth stands offsets much of the total annual growth. As a result, net annual growth of growing stock in the western sections was 5.2

[5] Many other factors, such as species composition, volumes per acre, accessibility, size and trees, ownership objectives and prices influence the volume of timber actually available for harvest.

Table 6.12—*Net volume of growing stock and sawtimber on commercial timberland in the United States, by softwoods and hardwoods and section, 1952, 1962, 1970, and 1977*

GROWING STOCK
(Million cubic feet)

Section	All species				Softwoods				Hardwoods			
	1952	1962	1970	1977	1952	1962	1970	1977	1952	1962	1970	1977
North	111,275	137,402	155,862	173,145	27,629	34,332	39,661	44,574	83,645	103,070	116,201	128,571
South	136,484	156,038	176,819	202,009	58,245	71,553	84,896	97,136	78,238	84,485	91,923	104,873
Rocky Mountain	91,435	97,606	99,290	99,814	87,457	93,104	94,413	94,935	3,978	4,502	4,877	4,879
Pacific Coast	264,201	256,737	248,456	236,000	251,614	241,833	230,820	219,134	12,587	14,904	17,636	16,866
United States	603,394	647,783	680,427	710,968	424,946	440,822	449,790	455,779	178,448	206,961	230,637	255,189

SAWTIMBER
(Million board feet, International ¼-inch log rule)

Section	All species 1952	All species 1962	All species 1970	All species 1977	Softwoods 1952	Softwoods 1962	Softwoods 1970	Softwoods 1977	Hardwoods 1952	Hardwoods 1962	Hardwoods 1970	Hardwoods 1977
North	248,629	282,153	319,662	359,021	58,756	69,877	82,877	96,504	189,873	212,276	236,785	262,517
South	409,191	465,093	534,596	614,709	196,556	245,712	295,804	341,023	212,635	219,381	238,791	273,686
Rocky Mountain	389,779	399,458	393,350	390,169	380,795	389,825	383,386	380,380	8,984	9,633	9,964	9,790
Pacific Coast	1,464,624	1,369,754	1,290,773	1,215,042	1,430,096	1,327,344	1,239,606	1,167,503	34,527	42,410	51,167	47,539
United States	2,512,222	2,516,458	2,538,379	2,578,940	2,066,203	2,032,758	2,001,673	1,985,408	446,018	483,700	536,706	593,532

Note: Data may not add to totals because of rounding.

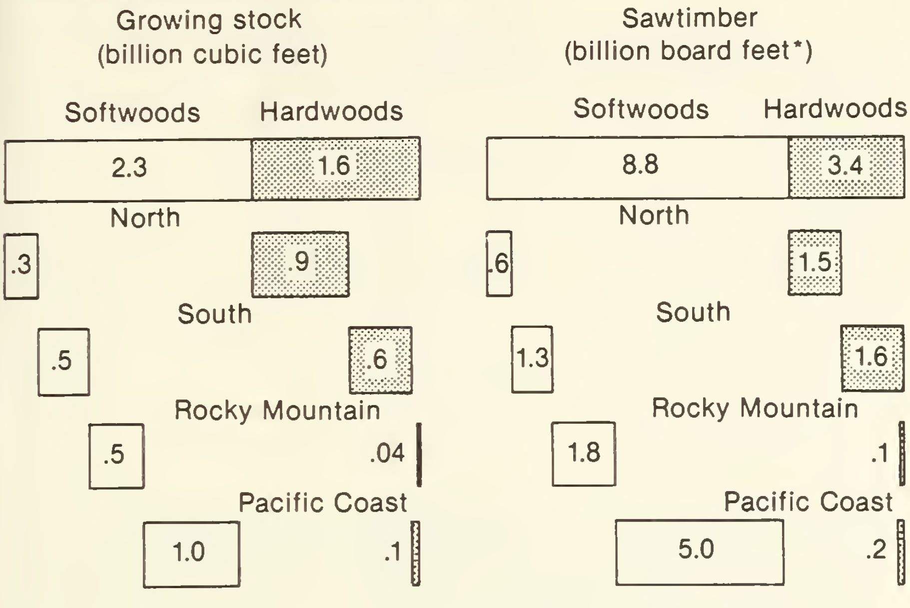
Table 6.13— *Annual mortality of growing stock and sawtimber on commercial timberland in the United States, by softwoods and hardwoods and section, 1952, 1962, 1970, and 1976*

Section	All species				Softwoods				Hardwoods			
	1952	1962	1970	1976	1952	1962	1970	1976	1952	1962	1970	1976
GROWING STOCK (*Million cubic feet*)												
North	734	989	1,154	1,220	217	295	334	329	517	694	820	891
South	953	1,147	977	1,121	332	398	425	512	621	749	552	609
Rocky Mountain	603	641	591	498	569	602	545	459	35	39	46	39
Pacific Coast	1,576	1,515	1,255	1,087	1,510	1,436	1,172	1,003	66	79	83	84
United States	3,866	4,292	3,978	3,925	2,628	2,730	2,476	2,303	1,239	1,561	1,502	1,622
SAWTIMBER (*Million board feet, International ¼-inch log rule*)												
North	1,299	1,760	2,007	2,086	365	495	603	582	933	1,265	1,404	1,503
South	2,627	3,123	2,517	2,927	883	1,023	1,069	1,312	1,743	2,100	1,448	1,616
Rocky Mountain	2,547	2,599	2,459	1,923	2,476	2,526	2,366	1,847	71	73	93	76
Pacific Coast	8,349	7,646	6,144	5,252	8,154	7,419	5,906	5,024	195	227	238	228
United States	14,821	15,129	13,126	12,188	11,879	11,463	9,944	8,765	2,942	3,665	3,183	3,423

Note: Data may not add to totals because of rounding.

Figure 6.10

Timber Mortality by Section, 1976



*International ¼-inch log rule

billion cubic feet or less than a quarter of the national total.

About two-thirds of the total net annual sawtimber growth in 1976 was on softwood species. Roughly half of the net annual softwood growth was comprised of southern pines and 12 percent of Douglas-fir (Append. 3, tables 3.35, 3.36, 3.37, and 3.38).

The one-third of the net annual growth that was on hardwoods included growth of both preferred species such as select red and white oaks, sweetgum, yellow-poplar, and ash, walnut and cherry (about two-fifths of the total) and species of more limited demand by industry such as other oaks, hickory, beech, and cottonwood (about three-fifths of the total).

Net Growth by Ownership. The largest share of the net annual growth in 1976 was on lands in farmer and other private ownerships. These lands contributed about 58 percent of the total, or 12.5 billion cubic feet (Append. 3, table 3.33). Moreover, the lands in this ownership provided nearly half of the softwood growth and something over 70 percent of the hardwood growth.

Forest industry lands provided nearly a fifth of the total net annual growth and the National Forests about 14 percent, largely softwoods. The other 9 percent of net growth was from other public ownerships.

The sources of net annual sawtimber growth were approximately the same and in roughly the same proportions as for growing stock.

Trends in Timber Growth. Net annual growth of growing stock increased from 14 to 21.7 billion cubic feet between 1952 and 1976, a rise of 56 percent (table 6.14, fig. 6.11). Most of this increase was in the period from 1962 to 1970. There were similar percentage increases for both softwoods and hardwoods. Net annual sawtimber growth increased somewhat more rapidly, rising more than 63 percent in the 1952–76 period.

Net annual growth has been rising in all sections (fig. 6.11). However, nearly three-fifths of the increase in softwoods between 1952 and 1976 was in the South. Another fifth was in the Pacific Coast. The remaining increase was equally divided between the North and the Rocky Mountains. Nearly all of the increase in net annual hardwood growth was in the eastern sections with the largest part in the South.

Net annual growth on a per acre basis also has been rising steadily on all ownerships and in all regions (table 6.15). Since 1952, the average per acre has increased from 28 to 45 cubic feet, a rise of 17 cubic feet or 61 percent. Farmer and other private and other public ownerships showed the greatest improvement, with both increasing output by more than 18 cubic feet per acre per year. In both cases, this represents an increase of nearly two-thirds since 1952.

Net annual per acre growth on National Forests increased more than 13 cubic feet between 1952 and 1976, when it averaged 35 cubic feet. This average is much below other ownerships because of the inclusion of the old-growth stands in the West, where mortality is high and net annual growth per acre is low. In the East, where stand characteristics are similar, net annual growth per acre on the National Forests is close to that of the other major ownerships.

Figure 6.11

Net Annual Growth of Growing Stock by Section, 1952–76

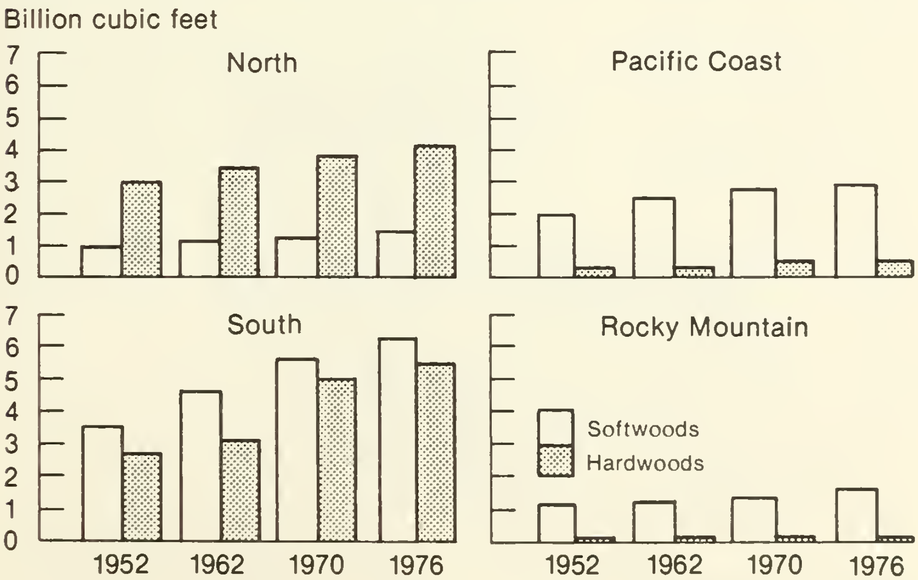


Table 6.14—*Net annual growth of growing stock and sawtimber on commercial timberland in the United States, by softwoods and hardwoods and section, 1952, 1962, 1970, and 1976*

GROWING STOCK
(Million cubic feet)

Section	All species				Softwoods				Hardwoods			
	1952	1962	1970	1976	1952	1962	1970	1976	1952	1962	1970	1976
North	3,985	4,741	5,288	5,792	993	1,234	1,362	1,600	2,992	3,507	3,926	4,192
South	6,448	7,813	9,576	10,705	3,625	4,680	5,605	6,158	2,823	3,133	3,971	4,547
Rocky Mountain	1,154	1,319	1,533	1,690	1,097	1,253	1,449	1,589	57	66	84	100
Pacific Coast	2,326	2,820	3,362	3,478	1,969	2,377	2,823	2,938	357	443	539	541
United States	13,913	16,693	19,759	21,664	7,684	9,543	11,239	12,285	6,229	7,149	8,520	9,380

SAWTIMBER
(Million board feet, International ¼-inch log rule)

Section	All species				Softwoods				Hardwoods			
	1952	1962	1970	1976	1952	1962	1970	1976	1952	1962	1970	1976
North	9,162	11,275	12,914	13,887	2,337	2,920	3,498	4,077	6,825	8,355	9,416	9,810
South	21,392	26,355	31,920	37,463	13,638	17,981	21,135	24,167	7,754	8,374	10,785	13,296
Rocky Mountain	4,264	4,648	5,241	6,593	4,166	4,541	5,098	6,337	98	107	143	255
Pacific Coast	11,069	12,892	16,166	16,678	10,029	11,534	14,540	15,110	1,040	1,358	1,625	1,568
United States	45,886	55,170	66,241	74,621	30,170	36,976	44,272	49,692	15,717	18,194	21,969	24,929

Note: Data may not add to totals because of rounding.

Table 6.15—*Average net annual and potential[1] growth per acre in the United States, by ownership and section, 1976*

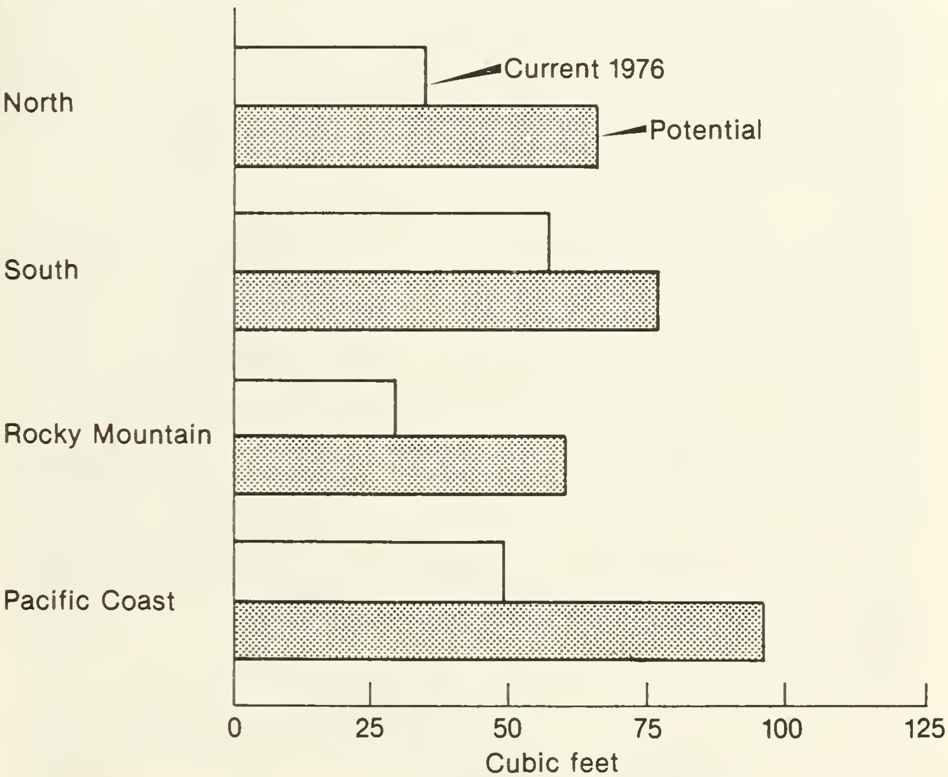
(Cubic feet)

Item	All ownerships	National Forest	Other public	Forest industry	Farmer and other private
North					
Current	35	43	36	44	33
Potential	66	63	59	74	66
South					
Current	57	57	54	60	56
Potential	77	71	71	83	77
Rocky Mountain					
Current	29	30	25	50	25
Potential	60	64	55	74	51
Pacific Coast					
Current	49	30	53	80	62
Potential	97	91	88	119	99
United States					
Current	45	35	42	59	45
Potential	74	74	68	87	72

[1]Potential growth is defined as the average net growth attainable in fully stocked natural stands. Much higher growth can be attained in intensively managed stands.

Figure 6.12

Current and Potential Net Annual Growth Per Acre by Section



Forest industry lands have the highest average net annual growth per acre. These lands are currently producing at the rate of nearly 59 cubic feet per acre per year. This is one-third above 1952 levels, an increase somewhat below that of other ownerships.

The rising trends in net annual timber growth illustrate a striking success story in American forestry. In the late 1800's and extending through the early decades of the 1900's, when the Nation's timber resources were being rapidly depleted, concern about future supplies led to the development of a broad array of policies and programs such as fire protection, tree planting, research, and public ownership. These policies and programs, especially fire protection, were operational on a substantial scale by the 1920's and 1930's. The large increases in net annual growth since 1952 surely reflect in large part the effects of actions taken.

Current Growth—Potential Growth Comparisons. In spite of the recent substantial increase, average net annual growth per acre on all ownerships is only about three-fifths of what can be attained in fully stocked natural stands (table 6.15, fig. 6.12). With the use of genetically improved trees, fertilization, spacing control, and other intensive management measures, much greater growth can be achieved, so much that no one really knows the biological limits.

The relatively limited net growth per acre of growing stock and sawtimber in relation to the potential in 1976, in part, reflects inadequate stocking of trees on much of the commercial timberland area, mortality and growth losses from destructive agents, the presence of brush and cull trees that limit regeneration and increment of growing stock trees, and the impacts of old-growth stands in the western softwood forests.

Comparisons of average net annual growth per acre with the potential in fully stocked natural stands provides one indication of levels of management. In general, these comparisons show that more of the potential is being achieved in the South than in the other sections. They also show that in the North and South average net annual growth as a percent of the potential is somewhat higher on the National Forests and other public ownerships than on the forest industry and farmer and other private ownerships. In most sections, there is little difference in the proportions of the potential being achieved on forest industry and the farmer and other private ownerships. Average net annual growth per acre is quite low in proportion to the potential on the National Forests in the Pacific Coast and Rocky Mountain sections. This again reflects the inclusion of large areas of old-growth stands where mortality is high.

The gap between current average net annual growth per acre and potential growth per acre in fully stocked natural stands is substantial on all ownerships and in all regions. Thus, it appears that there is a lot of room for improvement. From the standpoint of increasing total timber supplies, the potential is largest on the farmer and other private ownerships that include 58 percent of the commercial timberland. Most of the commercial timberland in these ownerships is in the mid or high productivity classes. Most of it is also advantageously located in relationship to roads, processing facilities, and the major timber markets.

In contrast, increasing average per acre growth on some other ownerships, and particularly on the unroaded areas in western National Forests where old-growth stands predominate, will be difficult and costly to achieve and require a considerable period of time.

Removals of Timber Inventories

Net annual growth adds to the Nation's timber inventories each year. At the same time, part of the timber inventories are removed. The timber removals from growing stock include (1) Harvests of roundwood products such as sawlogs, veneer logs, and pulpwood; (2) logging residues; and (3) other removals resulting from noncommercial thinnings and changes in land use, such as clearing for cropland, highways, or housing developments and withdrawal of commercial timberland for parks, wildernesses and other nontimber uses.

Timber Removals. Timber removals in 1976 totaled more than 14 billion cubic feet of growing stock, including 65 billion board feet of sawtimber (table 6.16). Roughly two-fifths of these removals came from the forests in the South. The largest part of the remainder came from the Pacific Coast. There were, however, substantial volumes of timber removals in the North and particularly of growing stock.

Softwoods made up some 71 percent of all growing stock removals, and 78 percent of all sawtimber removals in 1976. These removals were concentrated in the Pacific Coast and South. Nearly all of the hardwood removals were in the East—the portion coming from the South was somewhat larger than that from the North.

Softwood timber removals were roughly the same on the major ownerships (Append. 3, tables 3.39 and 3.40). A little over a third were from both the farmer and other private ownerships and forest industry ownerships. A little less than a third came from public lands, chiefly the National Forests. More than three-quarters of the hardwood removals were from farmer and other private ownerships with most of the remainder from forest industry ownerships.

Timber removals in 1976 were substantially above those in the 1950's and early 1960's, when they averaged about 12 billion cubic feet of growing stock, including more than 50 billion board feet of sawtimber. Current removals, however, are only slightly above 1970 levels. This in part reflects a relatively low level of demand for industrial timber products in 1976 resulting from the depressed situation in housing and nonresidential construction during that year.

Timber Products Output. By far the largest portion of timber removals from growing stock consists of roundwood timber products (table 6.17, fig. 6.13). In 1976, 88 percent of all softwood removals, and 68 percent of all hardwood removals, were used in this way. These products amounted to 11.7 billion cubic feet of roundwood, including 59 billion board feet of sawtimber.

In addition to roundwood harvests from growing stock, significant quantities of roundwood—about 1.1 billion cubic feet in 1976—were produced from rough and rotten trees, dead trees, and other nongrowing stock sources

About nine-tenths of the softwood timber and seven-tenths of the hardwood timber removed from growing stock inventories are used for industrial timber products or for fuel.

Table 6.16—*Annual removals of growing stock and sawtimber on commercial timberland in the United States, by softwoods and hardwoods and section, 1952, 1962, 1970, and 1976*

GROWING STOCK
(Million cubic feet)

Section	All species				Softwoods				Hardwoods			
	1952	1962	1970	1976	1952	1962	1970	1976	1952	1962	1970	1976
North	2,114	2,078	2,472	2,659	635	540	596	705	1,479	1,538	1,876	1,953
South	5,675	5,525	6,501	6,571	3,112	2,812	3,768	4,471	2,563	2,713	2,733	2,100
Rocky Mountain	537	741	892	845	534	738	889	842	3	4	4	3
Pacific Coast	3,536	3,615	4,229	4,153	3,489	3,534	4,112	4,028	47	81	117	126
United States	11,862	11,959	14,094	14,229	7,770	7,624	9,365	10,046	4,092	4,336	4,729	4,183

SAWTIMBER
(Million board feet, International ¼-inch log rule)

Section	All species 1952	All species 1962	All species 1970	All species 1976	Softwoods 1952	Softwoods 1962	Softwoods 1970	Softwoods 1976	Hardwoods 1952	Hardwoods 1962	Hardwoods 1970	Hardwoods 1976
North	6,420	6,371	8,621	8,413	1,814	1,439	2,021	2,223	4,606	4,932	6,600	6,190
South	20,150	18,433	23,097	26,637	11,881	10,891	14,894	18,938	8,269	7,542	8,204	7,698
Rocky Mountain	3,200	4,307	4,993	4,843	3,184	4,287	4,981	4,828	16	20	12	15
Pacific Coast	22,466	22,356	25,636	25,284	22,300	22,089	25,245	24,858	167	267	391	426
United States	52,236	51,467	62,347	65,177	39,179	38,705	47,140	50,847	13,058	12,761	15,207	14,329

Note: Data may not add to totals because of rounding.

Table 6.17—*Roundwood products, logging residues, and other removals from growing stock and sawtimber on commercial timberland in the United States, by softwoods and hardwoods and section, 1976*

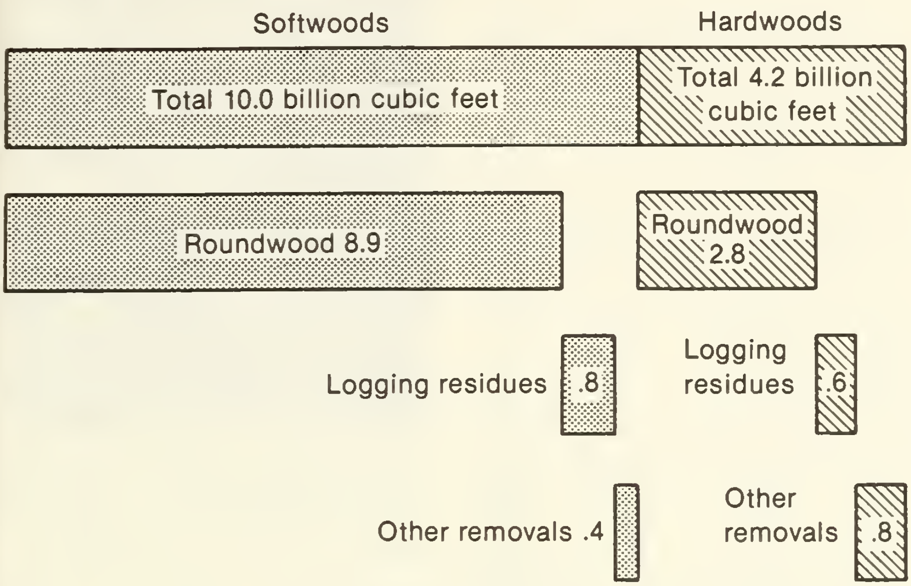
Section	All species				Softwoods				Hardwoods			
	Total	Round-wood products	Logging residues	Other removals	Total	Round-wood products	Logging residues	Other removals	Total	Round-wood products	Logging residues	Other removals
GROWING STOCK (Million cubic feet)												
North	2,659	1,811	329	520	705	556	69	80	1,953	1,254	259	440
South	6,571	5,511	548	512	4,471	4,021	252	198	2,100	1,490	296	315
Rocky Mountain	845	741	92	13	842	738	91	13	3	3	(1)	(1)
Pacific Coast	4,154	3,626	430	99	4,028	3,537	400	91	126	89	30	7
United States	14,229	11,687	1,398	1,143	10,046	8,852	813	381	4,183	2,835	585	762
SAWTIMBER (Million board feet, International ¼-inch log rule)												
North	8,413	7,029	409	974	2,222	1,928	65	229	6,190	5,101	344	745
South	26,637	23,660	1,416	1,561	18,938	17,629	661	649	7,698	6,031	755	912
Rocky Mountain	4,842	4,487	277	78	4,828	4,474	277	77	15	13	1	1
Pacific Coast	25,284	23,377	1,331	577	24,858	23,032	1,274	552	426	345	56	25
United States	65,176	58,552	3,433	3,191	50,847	47,062	2,277	1,508	14,329	11,490	1,156	1,683

[1]Less than 0.5 million cubic feet.

Note: Data may not add to totals because of rounding.

Figure 6.13

Timber Removals from Growing Stock, 1976



such as trees growing on low site forest lands and in fence rows and shelterbelts (Append. 3, table 3.67).

Total harvests of roundwood timber products from all sources thus amounted to an estimated 1976 "trend level" of output of 12.9 billion cubic feet. Harvests of all sawtimber size material including logs from nongrowing stock sources amounted to an estimated 65.2 billion board feet (including 50.9 billion board feet of softwoods and 14.3 billion board feet of hardwoods).

Sawlog harvests.—Sawlogs were the most important single product produced from U.S. forests in 1976, with output amounting to 6.7 billion cubic feet (table 6.18). This harvest included about 37.8 billion board feet of sawtimber.

Western forests supplied more than half of the total sawlogs produced in 1976 and more than one-third of all roundwood products. Most of the remaining sawlog and roundwood volumes came from the forests in the South (Append. 3, tables 3.47–3.67).

The output of softwood sawlogs was even more concentrated in the West and South. However, all but 4 percent of the hardwood sawlogs harvested in 1976 came from the Eastern States, with the cut about equally divided between the North and South.

Veneer log harvests.—Veneer log output in 1976 was 1.4 billion cubic feet or 8.7 billion board feet. About 93 percent of these volumes was softwood. Nearly three-fifths of this softwood volume came from the forests on the Pacific Coast. A small volume was also harvested in the Rocky Mountains. The remainder, about 500 million cubic feet, came from the South.

The South has only recently become an important source of softwood veneer logs. In the early years of softwood manufacture, large high-quality logs were required, but by 1970, a large proportion of the production of softwood plywood was in lower quality sheathing grades. Moreover, new equipment such as high-speed lathes with retractable chucks were developed which could profitably process small logs. As a result of these and other factors, such as the availability of timber and favorable location in respect to major consuming markets, the softwood plywood industry in the South has expanded rapidly since the mid-1960's, when the first plants were built. The hardwood plywood industry, and hardwood veneer log production, have been centered in the South for a much longer period of time.

Pulpwood harvests.—Pulpwood in terms of volume was the second most important timber product in 1976—total output was 3.8 billion cubic feet. Seventy percent of this volume came from the South. The strength and versatility of wood pulp from southern pine, plus historic advantages of low production costs and ready access to eastern and foreign markets, have helped increase the South's dominance of the U.S. pulp and paper industry.

Softwoods, chiefly the southern pines, composed about 69 percent of the pulpwood harvest in 1976. Proportions of hardwoods in pulpwood harvests have risen steadily, however, from 15 percent in 1952 to 31 percent in 1976. Equally significant has been a shift away from almost total dependence on soft-textured hardwood species such as aspen and gum, to the more plentiful oaks and other species such as hard maple, beech, hickory, and paper birch.

Most of the round pulpwood produced has come from poletimber sized trees and upper stems of sawtimber trees. However, a substantial proportion—about 44 percent of the total cubic volume of roundwood used in 1976, or 9.8 billion board feet—came from sawtimber.

In addition to the roundwood volumes, about 2 billion cubic feet of pulp chips obtained as byproducts from the manufacture of sawlogs and veneer logs into lumber and plywood was consumed in the pulp industry. This material is the primary source of wood fiber for the industry in the Pacific Coast.

Miscellaneous products harvests.—Production of utility poles, fence posts, mine timbers, pilings, cooperage, and other miscellaneous industrial products totaled an estimated 0.4 billion cubic feet of roundwood in 1976. A little over two-fifths of this came from the South and about a third from the North. Most of the remainder was cut from Pacific Coast forests. Softwoods were predominant, accounting for 63 percent of the output.

Fuelwood harvests.—Fuelwood harvests in 1976 amounted to 0.6 billion cubic feet. A little more than half of this was produced in the South and another third in the North. Most of the harvests in both sections was from hardwoods.

Logging Residues. Residues of trees left behind after logging operations constitute a fairly sizable part of removals of growing stock in 1976—some 8 percent of all softwood removals and 14 percent of all hardwood removals (table 6.17). These residues include material from growing stock trees from a 1-foot stump to a 4-inch top left behind after logging.

Volumes of logging residues from growing stock in 1976 totaled 1.4 billion cubic feet, or approximately 18 million cords, of solid wood fiber (table 6.17). About 58 percent of this volume was softwood, and 42 percent hardwood. About half of the softwood resi-

Table 6.18—*Output of timber products in the United States, by section, softwoods and hardwoods, and product, 1976*

(Million cubic feet)

Species group and product	Total	North	South	Rocky Mountain	Pacific Coast
Softwoods					
Saw logs	5,210	267	1,599	641	2,703
Veneer logs	1,330	3	498	65	764
Pulpwood	2,608	335	1,938	25	310
Miscellaneous industrial	238	27	122	18	71
Fuelwood	132	4	77	24	27
Total	9,518	636	4,234	773	3,876
Hardwoods					
Saw logs	1,432	700	667	1	64
Veneer logs	100	34	63	(1)	3
Pulpwood	1,155	454	677	(1)	24
Miscellaneous industrial	139	100	38	2	(1)
Fuelwood	470	214	246	1	9
Total	3,297	1,502	1,692	3	100
All species					
Saw logs	6,642	967	2,266	642	2,768
Veneer logs	1,431	37	561	65	767
Pulpwood	3,763	789	2,615	25	334
Miscellaneous industrial	378	127	160	20	71
Fuelwood	602	218	323	25	36
Total	12,815	2,138	5,925	777	3,976

[1]Less than 0.5 million cubic feet.

There are large volumes of wood left in the woods after logging. However, because of size and form, potential use of this wood is largely limited to fuel or for use in the manufacture of fiber or particle products.

dues were on recent logging operations in the Pacific Coast, and about one-third in the South.

There are no data on the volume of logging residues by ownership. However, they are likely to be roughly in proportion to timber removals. This suggests that perhaps as much as a third of the softwood residues in the Pacific Coast and a half of those in the Rocky Mountains are on National Forests. In the East, of course, the great bulk of the residues is on private ownerships.

In addition to the residues from growing stock, some two to four times as much material from rough and rotten trees, dead trees, limbs, and material under 4 inches in diameter is typically left on the ground after logging. This is exclusive of stumps and roots, which are potentially an economic resource in some areas.

Although there are large volumes of wood residues left on commercial timberlands after logging, there are some important obstacles to increased utilization. Because of size and form, nearly all of these residues are unsuitable for use in most timber products including lumber and plywood. Potential uses are largely limited to pulp, particleboard and fuel. Large volumes of residues, and especially those in the western sections, are remote from existing processing plants and potential markets for the end products. Most of the residues in the eastern sections are so widely scattered or occur in such small quantities that their use presents substantial practical and economic difficulties.

As a result of such factors, the estimated volumes of logging residues from growing stock as a percent of total removals have declined only 2 percent since 1962. Rapid growth of the pulp industry has led to closer utilization of the softwood timber cut, especially in the South. On the other hand, a decline in use of fuelwood has greatly reduced post-logging use of low-grade material. Also, increased use of mechanized harvesting systems may have tended to raise volumes of logging residues in some areas.

Environmental impacts of logging residues have become an important public issue in some areas, and public concern about this and the need to develop additional sources of fuel may supplement economic pressures to reduce residues. For example, recent action taken on National Forests to improve timber utilization includes modification of timber sale contracts to provide greater incentives for removal of low-value material.

Other Removals. Other removals largely include timber removed from growing stock inventories by land clearing for nontimber uses, or reservation of commercial timberland for parks, wilderness areas, or other purposes. These amounted to an estimated 1.1 billion cubic feet in 1976—or 8 percent of all removals (table 6.17). These are trend figures designed to show an average situation for recent years.

The largest part of the other removals in 1976 consisted of hardwoods, mainly removed in land clearing operations in the South and in other land-use changes in the North. A major part of other removals for softwoods also occurred in the South. In the West, most of the loss of timber in other removals was attributable to shifts of forest land, parks, wilderness areas, and other nontimber uses.

The available information suggests that part of the material removed in land clearing is used for industrial timber products or fuel and such material is shown as a part of timber products output. However, in clearing for crop and pasture land, roads, and other uses, part of the timber removed, most in some areas, is piled and burned.

Timber Growth—Removal Balances

Comparisons of net annual growth and removals provide an important indicator of the present and prospective timber situation including the physical availability of timber for harvest.[6]

Softwood Growth—Removal Balances. In the past 2½ decades, net annual growth of softwoods in the eastern sections of the United States has been considerably higher than removals (tables 6.19 and 6.20, fig. 6.14). For example, in 1976, net growth of eastern

[6] See footnote 5.

Table 6.19—*Net annual growth and removals of growing stock on commercial timberland in the United States, by softwoods and hardwoods and section, 1952, 1962, 1970, and 1976*

(Million cubic feet)

Section	All species				Softwoods				Hardwoods			
	1952	1962	1970	1976	1952	1962	1970	1976	1952	1962	1970	1976
North												
Net growth	3,985	4,741	5,288	5,792	993	1,234	1,362	1,600	2,992	3,507	3,926	4,192
Removals	2,114	2,078	2,472	2,659	635	540	596	705	1,479	1,538	1,876	1,953
Ratio of growth to removals	1.9	2.3	2.1	2.2	1.6	2.3	2.3	2.3	2.0	2.3	2.1	2.1
South												
Net growth	6,448	7,813	9,576	10,705	3,625	4,680	5,605	6,158	2,823	3,133	3,971	4,547
Removals	5,675	5,525	6,501	6,571	3,112	2,812	3,768	4,471	2,563	2,713	2,733	2,100
Ratio of growth to removals	1.1	1.4	1.5	1.6	1.2	1.7	1.5	1.4	1.1	1.2	1.5	2.2
Rocky Mountain												
Net growth	1,154	1,319	1,533	1,690	1,097	1,253	1,449	1,589	57	66	84	100
Removals	537	741	892	845	534	738	889	842	3	3	4	3
Ratio of growth to removals	2.1	1.8	1.7	2.0	2.1	1.7	1.6	1.9	19.0	22.0	21.0	33.3
Pacific Coast												
Net growth	2,326	2,820	3,362	3,478	1,969	2,377	2,823	2,937	357	443	539	541
Removals	3,536	3,615	4,229	4,154	3,489	3,534	4,112	4,027	47	81	117	126
Ratio of growth to removals	.7	.8	.8	.8	.6	.7	.7	.7	7.6	5.5	4.6	4.3
United States												
Net growth	13,913	16,693	19,759	21,664	7,684	9,543	11,239	12,285	6,229	7,149	8,520	9,380
Removals	11,862	11,959	14,094	14,229	7,770	7,624	9,365	10,046	4,092	4,336	4,729	4,183
Ratio of growth to removals	1.2	1.4	1.4	1.5	1.0	1.3	1.2	1.2	1.5	1.6	1.8	2.2

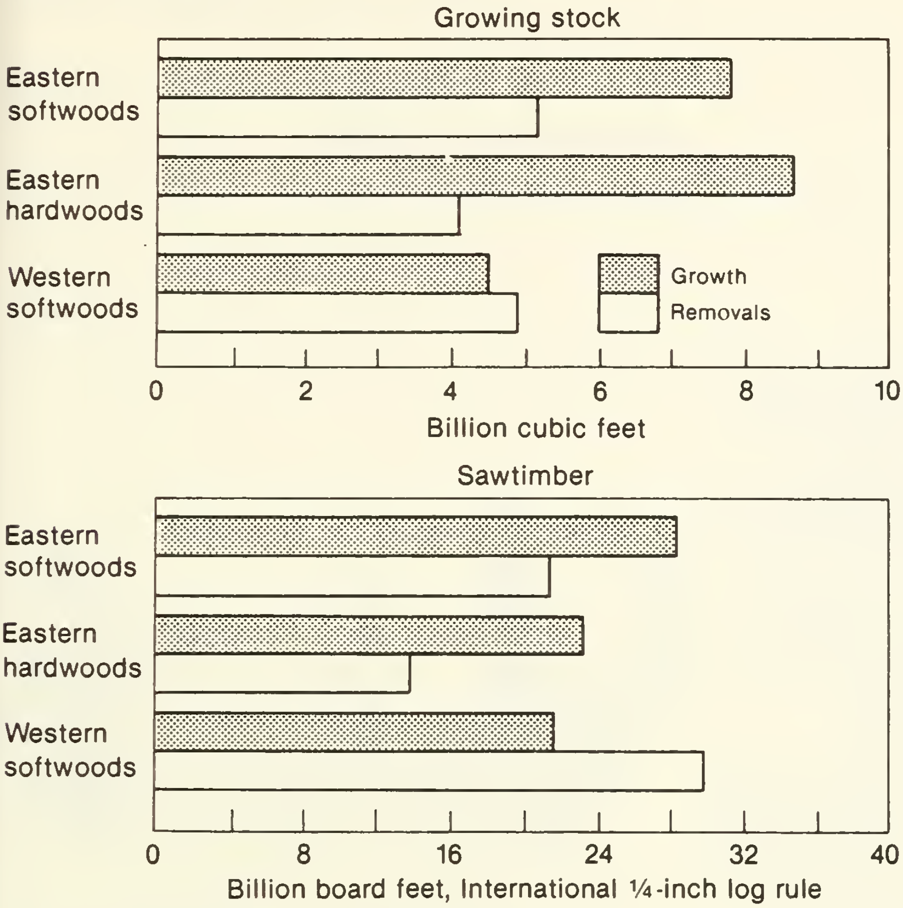
Table 6.20—*Net annual growth and removals of sawtimber on commercial timberland in the United States, by softwoods and hardwoods and section, 1952, 1962, 1970, and 1976*

(Million board feet, International ¼-inch log rule)

Section	All species				Softwoods				Hardwoods			
	1952	1962	1970	1976	1952	1962	1970	1976	1952	1962	1970	1976
North												
Net growth	9,162	11,275	12,914	13,887	2,337	2,920	3,498	4,077	6,825	8,355	9,416	9,810
Removals	6,420	6,371	8,621	8,413	1,814	1,439	2,021	2,223	4,606	4,932	6,600	6,190
Ratio of growth to removals	1.4	1.8	1.5	1.6	1.3	2.0	1.7	1.8	1.5	1.7	1.4	1.6
South												
Net growth	21,392	26,355	31,921	37,463	13,638	17,981	21,135	24,167	7,754	8,374	10,785	13,296
Removals	20,150	18,433	23,097	26,637	11,881	10,891	14,894	18,938	8,269	7,542	8,204	7,698
Ratio of growth to removals	1.1	1.4	1.4	1.4	1.1	1.7	1.4	1.3	.9	1.1	1.3	1.7
Rocky Mountain												
Net growth	4,264	4,648	5,241	6,593	4,166	4,541	5,098	6,337	98	107	143	255
Removals	3,200	4,307	4,993	4,843	3,184	4,287	4,981	4,828	16	20	12	15
Ratio of growth to removals	1.3	1.1	1.0	1.4	1.3	1.1	1.0	1.3	6.1	5.4	11.9	17.0
Pacific Coast												
Net growth	11,069	12,892	16,166	16,678	10,029	11,534	14,540	15,110	1,040	1,358	1,625	1,568
Removals	22,466	22,356	25,636	25,284	22,300	22,089	25,245	24,858	167	267	391	426
Ratio of growth to removals	.5	.6	.6	.7	.4	.5	.6	.6	6.2	5.1	4.2	3.7
United States												
Net growth	45,886	55,170	66,241	74,621	30,170	36,976	44.272	49,692	15,717	18,194	21,969	24,929
Removals	52,236	51,467	62,347	65,177	39,179	38,705	47,140	50,848	13,058	12,761	15,207	14,329
Ratio of growth to removals	.9	1.1	1.1	1.1	.8	1.0	.9	1.0	1.2	1.4	1.4	1.7

Figure 6.14

Timber Growth and Removals, 1976



softwood growing stock exceeded removals by 2.6 billion cubic feet, or 50 percent. Sawtimber growth was 7 billion board feet, or 33 percent, above removals.

Most of the excess of softwood growth over removals in the East was in the South. These generally favorable growth-removal balances indicate that eastern forests, and especially those in the South, can support larger softwood timber harvests. But large areas are still understocked, and a growth surplus will be needed for some time if inventories are to be built to higher levels. In addition, some part of the growth is on land held primarily for recreation or other nontimber purposes, and may not be available for harvest at any given time.

For the western United States, removals of softwood growing stock in 1976 exceeded net annual growth by 0.3 billion cubic feet, or 7 percent. Removals of softwood sawtimber was nearly 30 billion board feet, or over 8 billion board feet more than net annual growth.

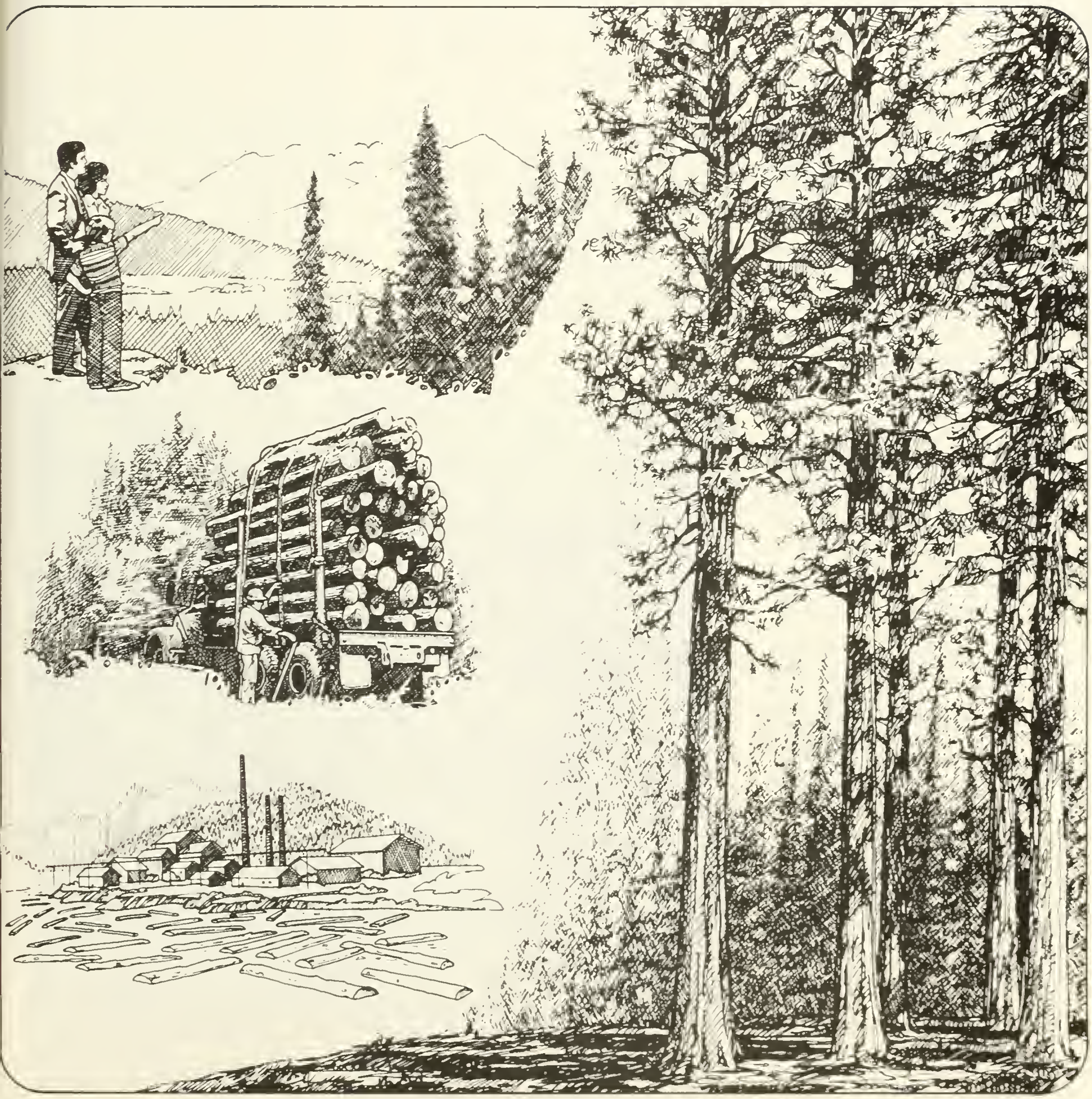
These apparent imbalances in the West do not, in themselves, represent a problem on some ownerships and in some areas because a sizable part of the western timber harvest is drawn from old-growth stands where allowable harvests can exceed net growth for some time to come. Generally speaking, deficit cutting in the West is occurring on the Pacific Coast; the Rocky Mountain Region is maintaining a favorable growth-removal balance.

Although the situation is not general, it is clear that removals on the Pacific Coast on forest industry ownerships are at levels that cannot be sustained given recent trends in investments in management programs. As indicated in a following section, a substantial reduction in harvests is inevitable on this ownership.

Hardwood Growth—Removal Balances. Net growth of eastern hardwoods in 1976 substantially exceeded removals, particularly in the North. For the entire East, net growth of hardwood growing stock was 8.7 billion cubic feet—116 percent above removals. Net growth of hardwood sawtimber was 23.1 billion board feet, 60 percent more than removals. Although overall growth-removal balances for hardwoods were generally favorable, in areas where extensive clearing has occurred—as along the river bottomlands in the West Gulf region in the South—net growth of hardwoods was less than removals.

Hardwood removals also tend to be concentrated on preferred species such as walnut, sweetgum, yellow birch, and the larger diameter trees. This has had adverse impacts on the quality of hardwood inventories, and contributed to a buildup of smaller diameter trees and nonpreferred species. For preferred species in specific locations, unfavorable growth-to-removal ratios exist. For example, in New Hampshire, removals of yellow birch sawtimber exceeded growth by 24 percent in 1976. In Vermont, ash sawtimber removals exceeded growth by 17 percent in the same year. Conversely, other hardwood species, such as red maple, some of the oaks, and hickory are not preferred species. It is these species that are increasing in volume.

Chapter 7
Projected Trends in Domestic Timber Resources



The current growth-removal balances show that domestic hardwood forests and eastern softwood forests can now support additional timber harvests. These growth-removal balances will, of course, change and future supplies, and particularly those in the last decades of the projection period, can vary over a wide range.

In recognition of this, one of the primary objectives of this study is to prepare base level projections that will show the likely trends in timber supplies (the volume of timber that would be harvested given the assumptions specified below) and other measures of the timber resource such as inventories and net annual growth, if recent trends in the major forces affecting the resource continue during the next five decades. These projections provide a means of identifying developing timber resource problems in time to adopt policies and programs which will change the outlook in ways considered to be desirable. Providing this foresight on developing problems and the lead time to change policies and programs in effective ways are the basic purposes of this study.

There is no intent to imply that the projected trends in the timber resource will actually continue during the next five decades nor that they should. In fact, it is expected that, as a result of the description of these trends, and the the associated economic, social, and environmental implications, actions will be taken to change the trends in ways which are considered to be more desirable.

The projections are derived from a computerized model which recursively simulates inventory changes and roundwood harvests. This model is described in Appendix 4. That Appendix also contains a brief discussion of other timber resource projection models and citations of the pertinent recent literature.

Assumptions on Basic Determinants

The specific assumptions on the major determinants of changes in the timber resource, including commercial timberland area, stumpage prices, radial growth, ingrowth and mortality rates, and stumpage prices and timber removals are described below.

Commercial Timberland Area. The area of commercial timberland is a major determinant of change in the major components of the timber resource.

The area of commercial timberland in the United States steadily declined after the country was settled and as land was cleared for crops, pastures, and various other uses such as cities and roads. This trend persisted until around 1920. Starting then, and continuing until the early 1960's, the acreage of commercial timberland increased by about 50 million acres as the worked-out cotton lands in the South, cleared areas on hill farms in the East, and the poorer farms in the other regions reverted back to forests. By 1962, the commercial timberland area in the United States reached 509 million acres (table 7.1).

During the 1960's, the upward trend in commercial timberland was reversed as losses due to changes in land use exceeded gains. In the 1970's, the rate of acreage loss accelerated. As a result, commercial timberlands declined 5 percent between 1962 and 1977 to 483 million acres.

The decline in area reflects the interaction of a number of forces. Throughout the country, there have been losses due to land clearing for highways, powerlines, and reservoirs. Urban development has caused losses in diverse parts of the country such as in New England, the middle Atlantic States, Georgia, Arkansas, Texas, and Washington. Extensive areas have been cleared for crops and pasture, especially in the South. Public lands have been withdrawn, largely in the West, for parks, wilderness, and other recreation uses. Private lands have been acquired for second homes or recreation use. At the same time, additions to the commercial timberland base from abandoned crop and pasture land have been declining.

In making the assumptions on changes in commercial timberland area for the 1977–2030 period, it was assumed that most of the forces which affected land use changes in the past

The area of commercial timberland has been declining. This reflects a number of forces—land clearing for roads, urban development, cropland and pastures; withdrawals for parks and wilderness; and the use of private lands for second home sites and recreation.

Table 7.1—*Area of commercial timberland in the United States, by ownership and section, 1952, 1962, 1970, and 1977, with base level projections to 2030*

(Million acres)

Ownership and section	1952	1962	1970	1977	Projections 1990	2000	2010	2020	2030
OWNERSHIP									
National Forest	94.7	96.9	94.7	88.7	81.3	80.4	79.8	79.2	78.8
Other public	49.0	46.8	46.9	47.0	46.6	46.5	46.4	46.4	46.4
Forest industry	59.5	61.6	67.0	68.8	70.9	72.2	72.7	73.0	73.1
Farmer and other private	296.1	304.1	287.8	278.0	268.8	261.9	256.4	251.6	247.9
Total	499.3	509.4	496.4	482.5	467.6	461.0	455.3	450.1	446.2
SECTION									
North	168.8	170.9	168.6	166.1	164.2	162.5	160.9	159.1	158.5
South	192.1	199.9	192.5	188.0	182.5	179.7	177.2	175.1	172.9
Rocky Mountain	63.9	64.4	62.1	57.8	56.1	55.2	54.4	53.6	53.0
Pacific Coast[1]	74.6	74.2	73.2	70.5	64.7	63.5	62.8	62.2	61.9
Total	499.3	509.4	496.4	482.5	467.6	461.0	455.3	450.1	446.2

[1]Includes Alaska.

Note: Data for 1952 and 1962 are as of December 31; all other years are as of January 1. The area projection figures include 5.1 million acres in 1990 and similar amounts throughout the projection period for interior Alaska and Hawaii for which no timber supply projections were prepared. Because of the very low levels of timber harvest in these areas, their exclusion has no appreciable influence upon the timber supply results or conclusion.

decade and a half will continue to operate in the future. For example, it was assumed that population, economic activity, and disposable personal income will increase during the projection years as shown in table 1.1 of this study. Further, it was assumed that there would be an increased demand for outdoor recreation areas on forested lands and that more commercial timberland will be needed for housing and industrial sites, highways, powerlines, reservoirs, and second family homes.

It was also assumed that recent trends in commercial timberland area among the major ownerships would continue. Forest industry ownership has been the only ownership showing a consistent upward trend in acreage, largely due to purchase of land from farmers and other private owners. However, as it has become increasingly expensive and difficult to purchase land, the forest industries have turned to various leasing arrangements for the timber rights on lands in other ownerships. This leasing trend has been particularly prevalent in the South. In making the projection, it was assumed the forest industries would continue to purchase commercial timberland, but at a decreasing rate.

The largest change in area of commercial timberlands has been in the farmer and other private ownerships, and this is expected to continue in the future. In those States where the area in farmer and other private ownerships has declined due to clearing for crops, pastures, urban development, etc., it was assumed that recent trends for each State would continue, but modified in line with expectations of future trends in such uses. In some States, such as West Virginia, where the area in commercial timberland has been increasing due to reforestation of abandoned crop and pasture land, it was assumed that gains would continue, but at a much reduced rate. However, in other States, such as Virginia, where there is evidence of increasing demands for the use of commercial timberlands for other purposes, it was assumed that the upward trends would be reversed.

In many States, the area of commercial timberland in the other public ownerships is expected to slowly decline because of diversions to such other uses as roads, powerlines, and reservoirs. However, in some States, increases seem likely. For example, in coastal Alaska a substantial acreage of National Forest land will be in State ownership by 1990. In the interior of Alaska, on the other hand, it seems likely that substantial acreages of State-owned commercial timberland will be transferred to private owners.

Commercial timberland projections for the National Forest ownership were made by personnel in the Regional Offices of the Forest Service. In making these projections, it was assumed that withdrawals for roads, powerlines, reservoirs, etc., would continue trends of the recent past. Shifts among commercial timberland components would follow the direction provided by management plans. The projections for each Region were also adjusted for probable withdrawals under the pending wilderness legislation. It was assumed that no new National Forest would be authorized for Alaska.

Commercial timberland area projections derived as described above are summarized in table 7.1 and figure 7.1. Commercial timberland area in the United States is projected to decline from approximately 483 million acres in 1977 to 446 million acres in 2030, a drop of over 36 million acres. The rate of decrease is steepest at the beginning of the projection period.

The largest projected decline is in the South, and is due chiefly to crop and pasture land development and urban and industrial expansion. Between 1977 and 2030, the commercial timberland area in this section is projected to fall by 15 million acres. The decline is almost entirely on the farmer and other private ownerships. Forest industry ownerships are projected to increase 3.5 million acres. There is also slight increase in the area in other public ownerships but a slight decline in the area in National Forests.

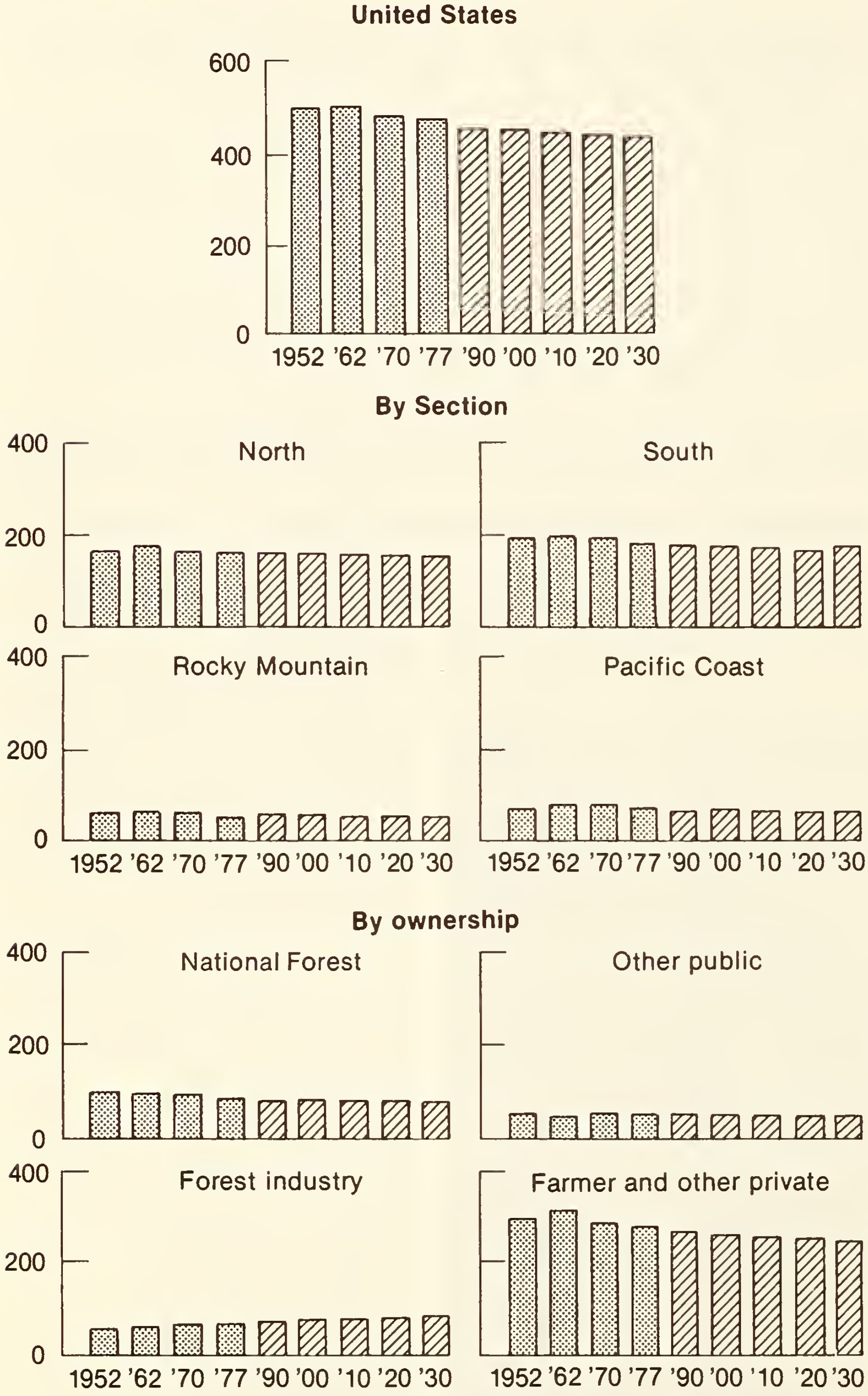
The commercial timberland area in the North is projected to fall by 7.6 million acres by 2030. Here again, the reduction is concentrated on farmer and other private ownerships, the area in forest industry ownership shows a small increase. The area in National Forests also increases a little in response to acquisition of forest land.

Between 1977 and 2030, the commercial timberland area in the Rocky Mountains is projected to fall by 4.8

Figure 7.1

Commercial Timberland Area Trends, 1952–77, with Projections to 2030

Million acres



million acres. Over half of this drop is on National Forests and largely reflects the reclassification of land to wilderness and recreation use. Nearly all of the remaining reduction is on farm and other private ownerships and reflects diversion to recreation and second family home use. The area in forest industry ownerships is not expected to change.

The commercial timberland area on the Pacific Coast, including Alaska, is projected to drop almost 9 million acres by 2030. Most of this decline—6.8 million acres—is on the National Forests and chiefly reflects withdrawals of commercial timberland for wilderness use. Primarily because of diversions to roads, powerlines, urban expansion, and industrial sites, the area in farmer and other private ownerships also falls. That area in forest industry ownership, however, stays about the same.

The above projections of commercial timberland areas have been based on a State-by-State analysis of trends by the major ownerships. The details of this analysis and the projections of commercial timberland area by State and ownership are contained in a Forest Service report now being prepared.[1]

Stumpage Prices. Stumpage prices are another major determinant of timber supply. If stumpage prices are high, owners are generally more willing to sell timber and the opportunity cost of pursuing nontimber management goals is significant. On the other hand, if the sum of stumpage, harvesting, and processing costs is greater than the sale price of the resulting primary product, the stumpage is not economically available.

Stumpage price trends have differed greatly among regions since the early 1950's. Softwood stumpage prices measured in constant 1967 dollars [2] in the Pacific Southwest, Pacific Northwest, Rocky Mountain and the southern regions have risen rapidly (table 7.2). In contrast, softwood and hardwood stumpage prices in the northern regions and hardwood prices in the southern regions have displayed no consistent upward trend in the past 25 years.

The base level assumptions on softwood stumpage prices used in this study [3] show substantial increases in all

[1] Wall, Brian R. Trends in commercial timberland areas in the United States by State and ownership, 1952–77, with projections to 2030. U.S. Dept. Agric., For. Serv. Gen. Tech. Rep. WO-31, 28 p. 1981.

[2] Stumpage prices in current dollars adjusted to exclude changes resulting from inflation or deflation.

[3] The stumpage prices used in projecting base level timber supplies were derived by first developing functional relationships between historical stumpage prices in each region and a composite of national lumber, plywood, and paper and board prices. The base level stumpage prices were then computed by applying the historical relationships in each region to the projected base level primary product prices discussed in Chapter 3. This approach assumes a stable elasticity of price transmission or re-

Table 7.2—*Trend level[1] stumpage price[2] indexes in the contiguous States, by softwoods and hardwoods and region, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Index of price per thousand board feet, International ¼-inch log rule—1967=100)

Species group and region	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Northeast	100.0	100.0	100.0	100.0	126.6	135.3	144.6	154.6	165.2
North Central	100.0	100.0	100.0	100.0	126.6	135.3	144.6	154.6	165.2
Southeast	57.8	83.3	111.6	138.9	132.9	139.1	145.8	152.9	160.5
South Central	57.8	83.3	111.6	138.9	132.9	139.1	145.8	152.9	160.5
Rocky Mountain	58.0	83.5	111.5	138.7	216.8	242.7	270.4	300.5	331.6
Pacific Northwest[3]									
Douglas-fir subregion (Western Washington and western Oregon)	43.8	75.9	118.0	164.2	119.8	132.8	146.7	161.6	177.5
Ponderosa pine subregion (Eastern Washington and eastern Oregon)	80.6	93.1	104.4	113.8	174.4	192.5	211.9	232.7	254.8
Pacific Southwest[4]	52.9	80.9	113.6	146.5	169.8	197.6	227.3	259.0	293.0
HARDWOODS									
Northeast	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
North Central	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Southeast	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
South Central	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1]Historical data are calculated prices on a least squares regression line fitted to time series stumpage price data for 1950-78. Projections derived as described in text footnote 3.
[2]Prices are measured in constant (1967) dollars and are net of inflation or deflation. They measure price changes relative to the general price level and most competing materials.
[3]Excludes Alaska.
[4]Excludes Hawaii.

regions (table 7.2). The greatest percentage increase in softwood stumpage price occurs in the Rocky Mountains. This in part reflects the low prices in this region relative to other regions. In contrast to softwoods, base level hardwood stumpage prices show no change through the projection period.

Radial Growth, Ingrowth, and Mortality Rates. The radial growth and mortality rates used in making the projections were based on the most recent data collected as a part of the periodic surveys of each State and National Forest carried out by the Renewable Resources Evaluation Work Units at the Forest and Range Experiment Stations and Timber Management Staffs (see Appendix 3). The change in number of trees going into the 2-inch diameter class (the ingrowth rate), another major determinant of change in the timber resource, was based on the average change between the two most recent surveys in most regions.

It was assumed that the values for these basic determinants—radial growth, and mortality rates—would not change through the projection period except in response to changes in stand density. Thus, there is no explicit allowance for future improvements in management of timber stands. However, the growth and mortality rates of the 1960's and early 1970's were greatly influenced by the forest management activity that occurred during those and earlier years. Thus, the projected changes in the timber resource are based on an implicit assumption that the management activity which influenced radial growth and mortality rates during the 1960's and early 1970's will continue through the projection period.

Timber Removals. Timber removals, are major determinants of total timber supplies that reach markets. Timber removals include: (1) Harvests of roundwood products such as sawlogs, veneer logs and pulpwood from growing stock and sawtimber, (2) logging residues and (3) other removals resulting from noncommercial thinnings, changes in land use such as clearing for cropland, highways or housing developments, and withdrawal of commercial timberland for parks, wildernesses, and other nontimber uses.

With regard to future harvest of roundwood products from growing stock and sawtimber,[4] it was assumed that they would respond to changes in stumpage prices and inventory characteristics much the same as during the base period from 1950–74. On the public lands, harvest levels were limited to the planned harvest ceilings.[5]

The projected supplies (harvests) of roundwood products from growing stock and sawtimber are internally generated by the model through interaction of stumpage prices and inventories (see Append. 4, fig. 4.1). The other components of removals—logging residues and other removals—are independent variables that are externally generated as follows.

Logging residues.—Logging residues have always been an important

lationship between primary product and stumpage prices over time. A discussion of the theoretical basis of the price transmission approach can be found in:

Haynes, Richard W. A derived demand approach to estimating the linkages between stumpage and lumber markets. Forest Sci. 23(2):281–288. 1977.

[4] It was assumed that harvests of roundwood products would equal the projection roundwood supplies from growing stock and sawtimber through the projection period.

[5] Harvest ceilings are defined as the programmed allowable harvest that would be realized in the absence of budgetary, manpower, or market constraints, but including technological constraints that will exist during each decade that financing alone will not resolve. It was assumed that current even-flow harvest policies would continue and that harvest ceilings would not exceed the potential yield. The harvest ceilings do equal the potential yields in each region at some point before the end of the projection period.

Table 7.3—*Logging residues as a percent of timber product removals from growing stock in the United States, by softwoods and hardwoods and section, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Percent)

Species group and section	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
North	11.5	11.0	10.8	11.0	9.0	7.6	6.4	5.6	5.0
South	6.6	6.3	6.9	5.9	4.6	3.9	3.4	3.1	3.0
Rocky Mountain	10.9	10.9	11.2	11.0	9.9	9.1	8.5	8.1	8.0
Pacific Coast[1]	12.2	11.7	12.5	10.2	9.7	8.8	7.9	7.3	6.8
United States	9.8	9.6	10.0	8.4	7.2	6.3	5.6	5.1	4.8
HARDWOODS									
North	15.8	15.3	15.2	17.2	15.0	13.2	11.5	9.7	8.0
South	25.9	24.4	22.6	16.6	16.0	14.5	13.9	11.5	10.0
Rocky Mountain	(2)	(2)	(2)	25.0	20.0	16.7	16.7	14.3	16.7
Pacific Coast[1]	28.6	26.0	27.4	25.2	22.0	16.9	14.3	13.1	12.1
United States	22.2	20.7	19.7	17.1	15.8	14.0	12.4	10.9	9.3

[1]Includes Alaska.
[2]Hardwood timber harvests are too small for accurate estimation of logging residues.

component of timber removals, although they have been declining as a percentage of the total. Between 1952 and 1976, for example, softwood logging residues dropped from about 9.8 percent of product removals from growing stock—roundwood products plus logging residues—to 8.4 percent, and hardwood residues fell from 22.2 percent to 17.1 percent (table 7.3). These declines largely reflect the effects of rising stumpage prices which have made it economical to remove more of the lower quality material that previously was left as logging residues. Technological innovations such as in-woods chipping and rapid growth in the demand for wood in the pulp industry and for industrial fuel have also contributed to the increased utilization.

Softwood logging residues as a percentage of product removals from growing stock are lowest in the South—5.9 percent in 1976—where transportation costs are relatively low and where harvest takes place in relatively young, defect-free stands. In the North and Rocky Mountains, softwood logging residues were 11 percent of product removals in 1976, the highest in the country. Hardwood logging residues, about 17 percent of product removals, compose a much larger percentage of product removals than for softwoods. This reflects limited markets for much of the low-quality material in the hardwood inventory.

For the projection period, it has been assumed that logging residues from both hardwoods and softwoods will decline as a percent of product removals from growing stock in all regions. Major factors in these declines are the expected increases in stumpage prices and intensified competition for wood fiber. This will result in increased use of small stems, chunks, and low-quality stems for fuelwood and pulpwood. Increased tree-length logging and in-woods-chipping of pulpwood and fuelwood will reduce residual formation. Another factor is anticipated improvement in felling and bucking practices. The decline in the harvest of old-growth timber in the West and increased use of hardwoods for pulping and for fuel are also expected to contribute to the improved utilization. In addition, various environmental considerations may require further improvements in utilization, particularly on public lands.

Other removals.—That part of timber removals classified as other removals is composed of (1) losses from timber inventories resulting from the diversion of commercial timberland to other uses such as crop or pasture land, roads, urban areas, parks, and wilderness, and (2) timber removed in cultural operations such as noncommercial thinning.

The historical data on other removals shown in this chapter are estimates of actual volumes for the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness that do not take place on a regular and continuing basis. Such land diversions are included in the projections. Thus, and as a result of expected withdrawals for wilderness in the 1980's, other removals in 1990 are substantially above the historical volumes.. After 1990, the major withdrawals for wilderness were assumed to be over and other removals decline in line with the assumed reductions in timberland areas.

Timber Supplies from Non-growing Stock Sources. The bulk of the projected timber supplies comes from growing stock and is internally generated by the model. Part of the supplies, however, comes from salvable dead trees, rough and rotten trees, tops and limbs, defective sections of growing stock trees in urban areas, fence rows and on forested lands other than commercial timberland. Output of timber products from non-growing stock sources is influenced by markets for pulpwood and fuelwood.

The proportion of roundwood supply originating from softwood non-growing stock sources has been dropping since 1952 (table 7.4). The hardwood supply showed a similar trend until the 1970's and then turned up slightly. The softwood stock supply proportion is projected to increase from 1976 to 1990, then decline but to levels higher than those found in the 1970's.

Among the major geographic sections, there are some trends that differ noticeably from the general U.S. trends. Old-growth forests on the Pacific Coast contain large volumes of salvable dead timber. With high demand for stumpage, and increasing use of lower quality material for pulpwood and fuelwood, the proportion of softwood timber supplies coming from non-growing stock sources on the Pacific Coast is expected

Table 7.4—*Timber product output from nongrowing stock sources as a percent of timber supplies in the United States, by softwoods and hardwoods and section, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Percent)

Species group and section	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
North	13.3	12.6	12.6	12.6	10.0	10.0	10.0	10.0	10.0
South	8.4	8.7	4.5	5.0	5.5	5.5	5.5	6.0	6.0
Rocky Mountain	5.8	5.6	4.7	4.5	5.0	5.0	5.0	5.0	5.0
Pacific Coast[1]	12.4	11.6	8.9	8.6	15.5	13.9	12.5	11.2	10.2
United States	10.4	10.0	7.0	6.9	9.5	8.7	8.1	7.9	7.6
HARDWOODS									
North	23.5	17.7	11.9	16.5	17.0	17.5	17.5	18.0	18.0
South	19.0	18.9	13.9	11.9	14.0	14.5	15.0	15.5	16.0
Rocky Mountain	(²)	(²)	(²)	(²)	(²)	(²)	(²)	(²)	(²)
Pacific Coast[1]	14.3	11.5	6.1	11.3	11.9	11.9	12.4	12.5	12.8
United States	20.9	18.5	13.9	14.0	15.2	15.6	15.9	16.4	16.7

[1]Includes Alaska.
[2]Hardwood timber harvests are too small for accurate estimation of output originating from nongrowing stock sources.

to rise to 15.5 percent in 1990. Beyond 1990, the part of timber supplies coming from non-growing stock sources falls, as old-growth stands become less important as a proportion of total inventory.

In the Rocky Mountains, non-growing stock sources provided 4.5 percent of the softwood supply in 1976. This is assumed to increase slightly, then remain essentially unchanged through the rest of the projection period.

Non-growing stock sources provided about 12.6 percent of the softwood timber supplies in the North in 1976. This is projected to drop to about 10 percent by 1990 and remain there through 2030. The proportion of softwood non-growing stock output in the South is low—5.0 percent in 1976. This increases slightly over the next several decades.

Hardwood forests contain large volumes of rough and rotten trees and tops and branches. Hardwoods also make up most of the urban forest, fence rows, and other similar sources of non-growing stock timber supplies. As a result, a substantial fraction of hardwood roundwood supplies, 14.0 percent in 1976, have come from non-growing stock sources since 1952.

With increasing demand for fuelwood and improvements in techniques for harvesting and processing hardwood for pulp and paper, non-growing stock is expected to continue to be an important and, in most regions, a growing part of hardwood timber supplies. In the North, for example, the proportion of hardwood timber supplies originating from non-growing stock rises from 16.5 percent in 1976 to 18.0 percent in 2030.

Other Assumptions. In addition to the basic assumptions described above, the projections of changes in the timber resource rest on a variety of other assumptions. For example, the continuation of a host of past behavioral patterns on the part of timber owners is implicitly assumed in the harvest equations. Constraints associated with multible use and the protection of the environment, and owner attitudes toward non-timber benefits as reflected in the historical response of harvest to price increases and inventory changes, are assumed to continue. Responses to such factors as the economic availability of timber, species composition, tree grade, accessibility, and operability are also assumed to continue much the same as in the base period used in making the projections.

Some conditions existed during the historical period which may not persist in the future. For example, there has been continual conflict about the use and management of commercial timberlands in public ownership. Harvesting has frequently been halted (or at least slowed) on lands when a status change was being considered, even before they were actually taken out of the commercial timberland base.

In recognition of the uncertainty about these and all other assumptions, a series of projections based on differing assumptions on commercial timberland area and radical growth and mortality rates, has been prepared. These projections, discussed at the end of this chapter, demonstrate the sensitivity of the projections to changed assumptions and provide some sense of the range over which the projections might reasonably be expected to vary.

Projected Changes in Timber Resources in the United States

Projections prepared under the assumptions described above show substantial changes in all of the important measures of the timber resource—timber supplies, net annual growth, and inventories (tables 7.5 and 7.6). There are also sizable shifts among the geographic sections and the major ownerships (tables 7.7-7.10).

Trends in Timber Supplies. In 1952, roundwood harvests[6] amounted to 10.9 billion cubic feet. Harvests were slightly lower in 1962 but they subsequently increased to 12.8 billion cubic feet in 1976. The trends in harvests of sawtimber products are similar to those for roundwood—output rose from 49.1 billion board feet in 1962 to 62.9 billion in 1976. Most of the increases between 1972 and 1976 was composed of softwoods harvested on forest industry and farmer and other private lands in the South.

Roundwood supplies[6] are projected to increase to 21.2 billion cubic feet in

[6] Harvests as used here are estimates of the trend levels of timber products harvested in 1952, 1962, 1970 and 1976. Supplies as used here are estimates of the volume of timber products that would be harvested in the projection years under the assumptions specified above.

Table 7.5—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the United States, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock									
Roundwood products	6,752	6,593	8,096	8,850	9,389	10,101	10,664	11,084	11,396
Logging residues	734	701	901	812	731	682	629	599	578
Other removals[1]	283	329	320	382	2,139	995	766	712	620
Total	7,770	7,624	9,318	10,044	12,259	11,777	12,059	12,395	12,594
Net annual growth	7,684	9,543	11,239	12,285	13,240	13,470	13,472	13,382	13,224
Mortality	2,628	2,730	2,476	2,303	2,470	2,608	2,719	2,795	2,850
Roundwood supplies[2]									
From growing stock	6,752	6,593	8,096	8,850	9,389	10,101	10,664	11,084	11,396
From other sources[3]	785	736	605	661	980	958	943	950	938
Total	7,536	7,329	8,701	9,511	10,369	11,058	11,607	12,034	12,334
Inventory of growing stock[4]	424,946	440,882	449,790	455,779	468,521	490,216	508,550	522,314	532,252
HARDWOODS									
Removals from growing stock									
Roundwood products	2,658	2,488	2,950	2,833	4,145	5,085	5,939	6,795	7,378
Logging residues	757	648	722	585	776	831	844	827	753
Other removals[1]	674	1,197	1,054	761	817	788	724	690	568
Total	4,089	4,333	4,726	4,180	5,738	6,704	7,508	8,312	8,699
Net annual growth	6,229	7,149	8,519	9,380	9,431	8,846	8,253	7,850	7,618
Mortality	1,239	1,561	1,502	1,622	2,078	2,297	2,405	2,423	2,385
Roundwood supplies[2]									
From growing stock	2,658	2,488	2,950	2,833	4,145	5,085	5,939	6,795	7,378
From other sources[3]	704	564	441	462	741	942	1,126	1,336	1,483
Total	3,362	3,052	3,391	3,295	4,886	6,027	7,065	8,132	8,861
Inventory of growing stock[4]	178,448	206,961	230,637	255,189	315,637	346,879	362,381	364,507	357,308

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

2030 and 83.1 billion board feet—levels that are, respectively, 66 and 32 percent above those of 1976. Nearly all of the projected increases are in the East, chiefly in the South. Some increase in supplies is projected in the Rocky Mountain section. On the Pacific Coast, there is not much change in projected roundwood supplies and a rather substantial decrease in sawtimber supplies.

With the exception of forest industry ownerships, where the projected decreases on the Pacific Coast are concentrated, there are substantial additions to supplies on all other ownerships. Most of the projected increase in supplies is on farmer and other private ownerships. This primarily reflects the large size of the commercial timberland area in these ownerships relative to the other ownerships and the responsiveness of these ownerships to increases in prices and inventories.

Trends in softwood supplies.—The harvest of softwood roundwood products has followed about the same trend as total harvests, rising 30 percent between 1962 and 1976 to a total of 9.5 billion cubic feet (fig. 7.2). This was paralleled by a 31 percent increase in sawtimber product output to 50 billion board feet (fig. 7.3).

Softwood supplies are projected to move up but at a slower rate than experienced from 1962 to 1976. By 2030, roundwood supplies rise by about 30 percent to 12.3 billion cubic feet and sawtimber supplies by 11 percent to 55.6 billion board feet. The greater increase in roundwood supplies results from increased use of smaller diameter trees, primarily for pulpwood and fuelwood.

Roughly equal shares of the 1976 softwood supplies came from the South and Pacific Coast and together they accounted for 85 percent of the softwood roundwood supplies in the United States. The remaining 15 percent was about equally split between the North and Rocky Mountains.

The Pacific Coast played a more dominant role in the supply of softwood sawtimber products in 1976, providing 50 percent of the total compared to 36 percent from the South. The importance of the Pacific Coast largely reflects the softwood inventory—that section has nearly three-fifths of the softwood sawtimber inventory mostly in the relatively large trees characteristic of an old-

Table 7.6—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the United States, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber									
Roundwood products	35,339	34,662	42,943	47,051	43,183	45,824	48,095	49,911	51,311
Logging residues	2,584	2,633	2,444	2,276	1,942	1,787	1,635	1,548	1,491
Other removals[1]	1,248	1,402	1,491	1,509	11,243	4,894	3,537	3,269	2,798
Total	39,171	38,696	46,878	50,836	56,368	52,505	53,266	54,729	55,600
Net annual growth	30,170	36,976	44,272	49,692	52,812	55,875	57,935	59,016	59,197
Mortality	11,879	11,463	9,944	8,765	8,928	9,149	9,439	9,695	9,957
Roundwood supplies[2]									
From sawtimber	35,339	34,662	42,943	47,051	43,183	45,824	48,095	49,911	51,311
From other sources[3]	3,402	3,481	3,153	2,903	4,931	4,630	4,422	4,350	4,239
Total	38,741	38,143	46,097	49,954	48,115	50,454	52,517	54,262	55,551
Inventory of sawtimber[4]	2,066,203	2,032,757	2,001,673	1,985,408	1,921,103	1,951,140	1,996,665	2,040,293	2,078,748
HARDWOODS									
Removals from sawtimber									
Roundwood products	11,145	10,091	11,313	11,350	12,502	15,604	18,432	21,230	22,936
Logging residues	771	989	1,213	1,146	1,334	1,474	1,529	1,519	1,384
Other removals[1]	1,123	1,660	2,660	1,797	2,542	2,428	2,221	2,110	1,746
Total	13,039	12,740	15,187	14,293	16,379	19,507	22,183	24,859	26,066
Net annual growth	15,717	18,194	21,969	24,929	26,444	26,610	26,127	25,409	24,441
Mortality	2,943	3,665	3,183	3,423	4,361	4,902	5,219	5,323	5,261
Roundwood supplies[2]									
From sawtimber	11,145	10,091	11,313	11,350	12,502	15,604	18,432	21,230	22,936
From other sources[3]	779	842	1,102	1,552	2,210	2,855	3,457	4,135	4,577
Total	11,924	10,933	12,414	12,902	14,713	18,460	21,889	25,365	27,513
Inventory of sawtimber[4]	446,018	483,700	536,706	593,532	740,964	824,376	874,293	890,263	877,842

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

The softwood (southern pine) forests of the South can support higher levels of harvest in the decades immediately ahead.

growth forest. More than three-fifths of the softwood sawtimber in the Pacific Coast section is on the National Forests.

The relative importance of the South and Pacific Coast forests as sources of softwood timber is projected to change materially by 2030. The softwood roundwood supplies in the South are projected to rise by 47 percent to 6.2 billion cubic feet. The majority of the increase comes from the farmer and other private ownerships. Sizable percentage increases are also projected for the North and Rocky Mountains, but the volumes involved are relatively small in relation to the total national softwood supply.

In contrast to the outlook in the South, softwood roundwood supplies are projected to drop in the Pacific Coast, from 3.9 billion cubic feet in 1976 to 3.7 billion cubic feet in 2000. There is a subsequent rise back to 3.9 billion cubic feet in 2030. The major cause of the initial decline in the Pacific Coast is the physical incapacity of the forest industry lands to maintain current cutting levels. The old-growth inventory on these ownerships is rapidly being depleted and harvests from merchantable second-growth stands cannot be maintained at a level which will offset the decline in supplies from old-growth stands.

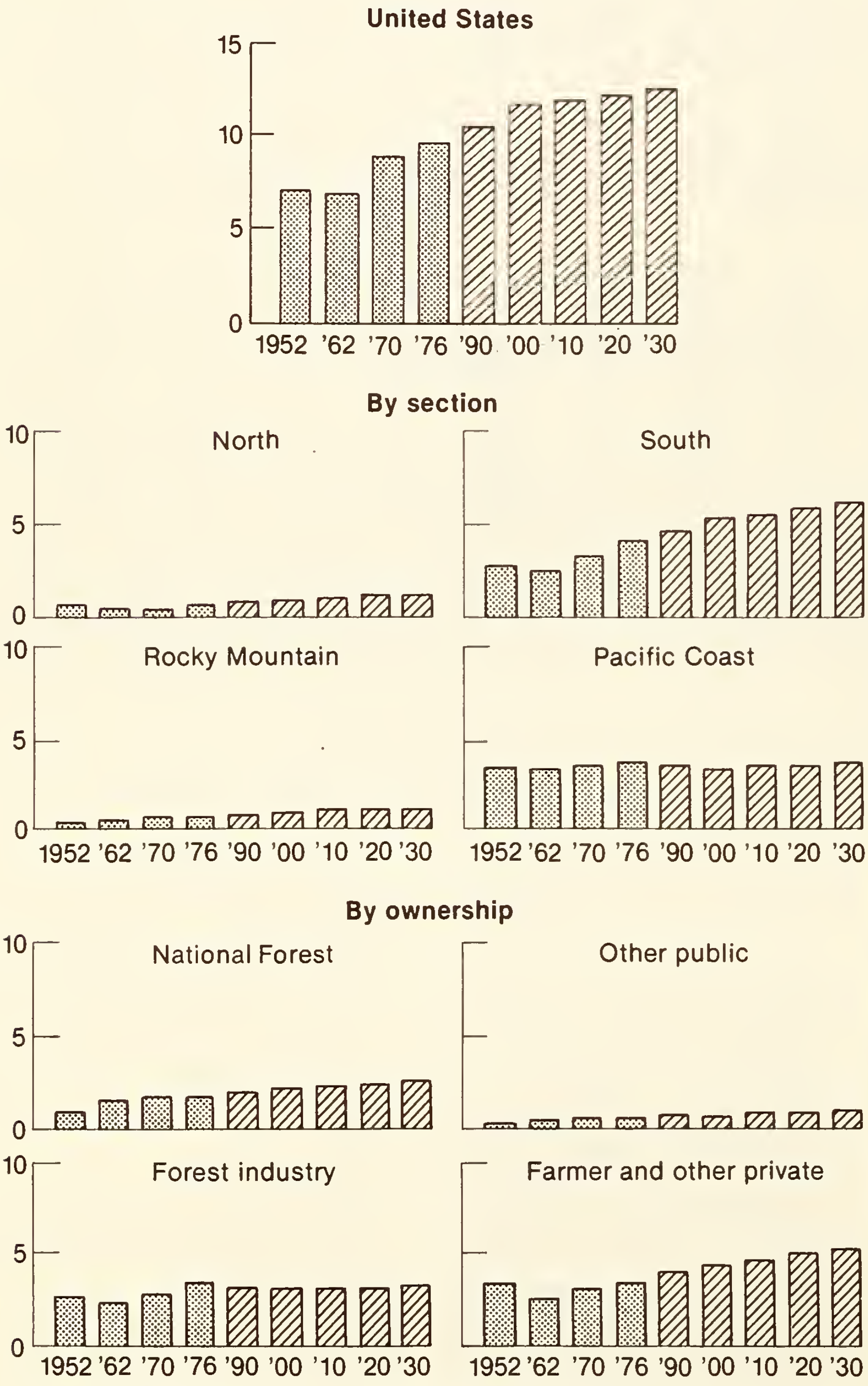
At the same time, National Forest harvest levels in the Pacific Coast section are constrained by even-flow harvest schedules and non-timber management considerations and are further influenced by major withdrawals of commercial timberland for wilderness designation. Supplies from the farmer and other private owners in the Pacific Coast are projected to increase, which

is a reversal of a 25-year downward trend in roundwood supplies from this ownership. However, the increases are not large enough to compensate for the drop on forest industry ownerships.

The supply projections for softwood sawtimber products have the same basic pattern as the roundwood projections, but the decline in Pacific Coast supplies and the changes in regional shares are more pronounced. The projected supplies from the Pacific Coast drop 13 percent from 25.2 billion board feet in 1976 to 22.0 billion in 1990. They continue to decline slowly thereafter to 19.6 billion board feet in 2030. In contrast, the supply from the South is projected to increase steadily to 27.3 billion board feet by 2030, 52 percent above the 1976 supply.

Figure 7.2

Softwood Roundwood Harvests, 1952-76, with Projections of Supplies to 2030
Billion cubic feet



The result of these divergent sectional paths is that the large projected increases in softwood timber supplies from the South are partly offset by declines from the Pacific Coast, leaving a relatively modest net gain in the national total. By 2030, about half of both the softwood roundwood and softwood sawtimber product supplies are projected to originate in the South, 31 percent of the softwood roundwood and 35 percent of the softwood sawtimber product supplies will come from the Pacific Coast.

Changes of these magnitudes are certain to have major and long lasting impacts on the economies of the two sections. For the Pacific Coast, it will mean closed mills and reduced timber-based employment and income. The impacts are likely to be particularly severe in rural areas where timber is the chief source of economic activity. In the South, on the other hand, it suggests new timber-based industry and associated increases in employment and income.

Since the projected drop in Pacific Coast supplies is concentrated on forest industry ownerships, and the major source of the increases in the South is farmer and other private lands, there is a sizable shift among the major ownerships as sources of timber. The shift is largest for softwood sawtimber products where the proportion coming from farmer and other private ownerships rises from 29 percent of the total in 1976 to 41 percent in 2030. During the same period, the proportion originating on forest industry ownerships falls from 38 percent of the total to 24 percent. There is a small increase in the part coming from the National Forests and very little change on the other public ownerships.

Trends in hardwood supplies.—In contrast to softwoods, the harvest of hardwoods was fairly stable between 1952 and 1976 at around 3 billion cubic feet of roundwood and 12 billion board feet of sawtimber products (figs. 7.4 and 7.5). The outlook is for substantial increases. Hardwood roundwood supply is projected to more than double between 1976 and 2030, rising from 3.3 to 8.9

billion cubic feet. The supply of sawtimber products is projected to move up from 12.9 to 27.5 billion board feet during the same period.

In 1976, hardwoods accounted for only 26 percent of the total roundwood supply and 21 percent of the total board foot supply. By 2030, hardwoods are projected to account for 42 percent of the roundwood supplies and 33 percent of the sawtimber product supplies.

There are two major reasons for the proportionally larger increases in hardwood supplies. First, hardwood supplies are more responsive to changes in prices than softwoods. This largely reflects the large volumes of hardwood timber available in eastern forests. Second, there are no volume limitations, such as exist for softwoods on forest industry lands in the Pacific Coast. Also, constraints on softwood harvests on public lands have little impact on hardwood supplies which are obtained largely from private lands.

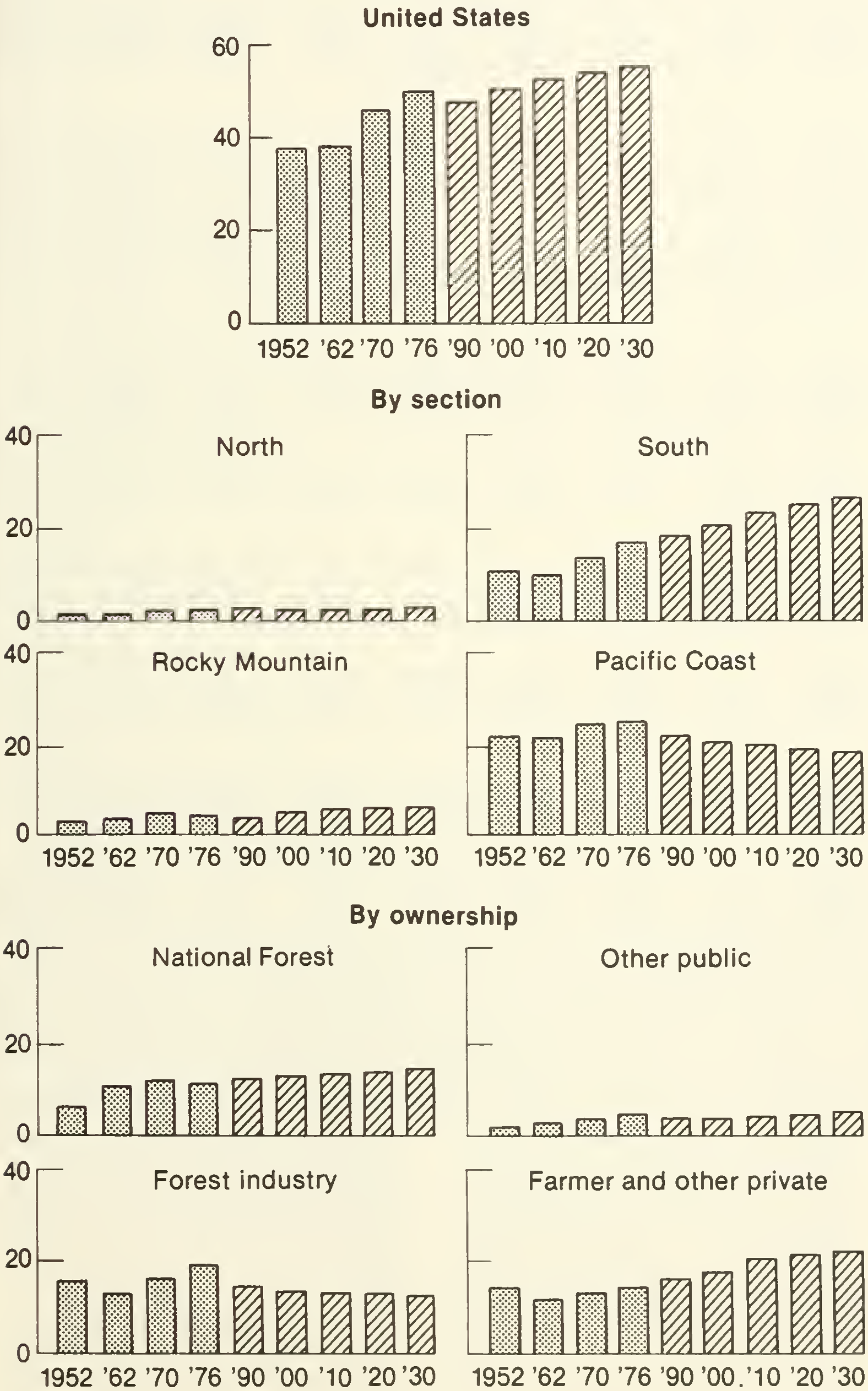
Although less pronounced than the projected shift in softwood supplies, an increasing share of the hardwood roundwood supplies is projected to come from the South, from 51 percent in 1976 up to 59 percent in 2030. The share from the North shows a corresponding decline. As was the case for softwoods, the regional shift of hardwood sawtimber product supplies is greater than for roundwood. In the South, projected hardwood sawtimber product supplies rise from 6.3 to 17.4 billion board feet over the projection years and the sectional share goes up from 49 to 63 percent. The cause of the shift to the South is a lower supply response from the farmer and other private owners in the North than in the South, possibly caused by a differential in the strength of non-timber management objectives in the two sections.

The farmer and other private owners are projected to continue to produce about three-fourths of the hardwood roundwood and hardwood sawtimber supplies. The shares of the other ownership groups are also expected to remain about the same through the projection period.

Figure 7.3

Softwood Sawtimber Harvests, 1952-76, with Projections of Supplies to 2030

Billion board feet, International ¼-inch log rule



Source of timber supplies.—Nearly 8.9 billion out of the total 9.5 billion cubic feet of softwood roundwood harvests in 1976 came from growing stock (table 7.5). The remainder, 0.7 billion cubic feet or 7 percent, came from rough and rotten trees, salvable dead trees, forest land other than commercial timberland, and sources such as fence rows and urban areas. Growing stock is projected to continue as the source of over nine-tenths of softwood roundwood supplies. However, as indicated in table 7.4, a small increase in the proportion coming from non-growing stock sources is likely by 1990. As a result, softwood timber supplies from this source rise to nearly 1 billion cubic feet in that year and remain close to this level through the rest of the projection period.

Table 7.7—*Roundwood supplies, net annual growth, and growing stock inventory in the United States, by section and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
North[1]									
Softwoods									
Roundwood supplies	596	501	549	636	820	921	993	1,050	1,094
Net annual growth	993	1,234	1,362	1,600	1,722	1,660	1,554	1,452	1,374
Inventory	27,629	34,332	39,661	44,574	56,996	65,069	71,425	76,111	79,676
Hardwoods									
Roundwood supplies	1,381	1,329	1,464	1,502	2,024	2,422	2,805	3,217	3,510
Net annual growth	2,992	3,507	3,926	4,192	4,305	3,963	3,623	3,386	3,282
Inventory	83,645	103,071	116,201	128,571	161,994	180,021	191,074	195,797	197,201
South									
Softwoods									
Roundwood supplies	3,049	2,709	3,531	4,234	4,887	5,392	5,774	6,053	6,229
Net annual growth	3,625	4,680	5,605	6,158	6,720	6,800	6,732	6,625	6,488
Inventory	58,246	71,554	84,896	97,137	119,833	134,699	145,385	152,465	156,120
Hardwoods									
Roundwood supplies	1,935	1,648	1,833	1,692	2,732	3,466	4,117	4,773	5,213
Net annual growth	2,823	3,133	3,971	4,547	4,724	4,563	4,362	4,226	4,120
Inventory	78,238	84,486	91,923	104,873	130,525	142,820	146,839	144,123	135,550
Rocky Mountain[1]									
Softwoods									
Roundwood supplies	496	684	814	773	906	1,008	1,076	1,125	1,143
Net annual growth	1,097	1,253	1,449	1,589	1,629	1,607	1,557	1,493	1,427
Inventory	87,457	93,104	94,413	94,935	101,425	106,171	109,903	112,500	114,324
Hardwoods									
Roundwood supplies	11	14	12	4	5	5	5	6	5
Net annual growth	57	66	84	100	98	96	94	91	87
Inventory	3,978	4,502	4,877	4,879	6,129	6,519	6,865	7,147	7,338
Pacific Coast									
Softwoods									
Roundwood supplies	3,395	3,435	3,807	3,868	3,757	3,737	3,764	3,806	3,868
Net annual growth	1,969	2,377	2,823	2,938	3,168	3,402	3,629	3,814	3,935
Inventory	251,614	241,833	230,820	219,134	190,267	184,276	181,835	181,238	182,132
Hardwoods									
Roundwood supplies	35	61	82	97	126	134	137	136	133
Net annual growth	357	443	539	541	305	225	175	147	129
Inventory	12,586	14,904	17,636	16,866	16,989	17,518	17,603	17,440	17,219
United States									
Softwoods									
Roundwood supplies	7,536	7,329	8,701	9,511	10,369	11,058	11,607	12,034	12,334
Net annual growth	7,684	9,543	11,239	12,285	13,240	13,470	13,472	13,382	13,224
Inventory	424,946	440,822	449,790	455,779	468,521	490,216	508,550	522,314	532,252
Hardwoods									
Roundwood supplies	3,362	3,052	3,391	3,295	4,886	6,027	7,065	8,132	8,861
Net annual growth	6,229	7,149	8,519	9,380	9,431	8,846	8,253	7,850	7,618
Inventory	178,448	206,961	230,637	255,189	315,637	346,879	362,381	364,507	357,308

[1]Data for the Great Plains States—Kansas, Nebraska, North Dakota, and eastern South Dakota included in the North.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

About 0.5 billion cubic feet, or 14 percent of the hardwood roundwood harvests in 1976, came from nongrowing stock sources (table 7.5). The nongrowing stock proportion of hardwood supplies is projected to rise slightly. This increase largely reflects utilization improvements which result from the assumed price increases and improved technology. It also reflects a rise in the value of high quality hardwood logs of desired species which make it economical to search out and harvest trees not included in the commercial timberland. Given such an increase in proportion, total hardwood roundwood supplies from nongrowing stock sources move up to 1.5 billion cubic feet in 2030, over three times the volume in 1976. Most of the growth in volume takes place in the early part of the projection period.

The proportion of the projected supplies of sawtimber products coming from growing stock and non-growing stock sources is about the same as that of roundwood. Projected trends are also similar.

Trends In Timber Removals. By far the largest component of timber removals, 88 percent in the case of softwood roundwood removals in 1976, is the

Table 7.8—*Sawtimber supplies, net annual growth, and sawtimber inventory in the United States, by section and softwoods and hardwoods, 1952, 1962, 1970, and 1976, wtih base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
North[1]									
Softwoods									
Sawtimber supplies	1,846	1,430	2,033	2,169	2,220	2,525	2,793	3,055	3,309
Net annual growth	2,337	2,920	3,498	4,077	4,237	4,579	4,845	5,041	5,197
Inventory	58,756	69,876	82,877	96,501	122,525	142,413	162,646	182,593	202,649
Hardwoods									
Sawtimber supplies	4,090	4,413	5,861	6,188	5,480	6,549	7,603	8,807	9,674
Net annual growth	6,825	8,355	9,417	9,809	9,936	10,050	10,052	10,039	10,081
Inventory	189,872	212,277	236,784	262,517	326,105	363,247	391,946	410,969	424,684
South									
Softwoods									
Sawtimber supplies	11,342	10,275	14,225	17,985	19,404	21,867	24,068	25,934	27,327
Net annual growth	13,638	17,981	21,136	24,167	26,999	28,821	29,826	30,223	30,076
Inventory	196,556	245,712	295,804	341,022	427,160	495,310	555,193	604,146	638,275
Hardwoods									
Sawtimber supplies	7,692	6,301	6,224	6,336	8,798	11,442	13,804	16,084	17,381
Net annual growth	7,754	8,374	10,785	13,296	15,292	15,591	15,269	14,669	13,732
Inventory	212,634	219,381	238,791	273,686	352,397	397,063	418,028	415,744	390,687
Rocky Mountain[1]									
Softwoods									
Sawtimber supplies	3,133	4,196	4,928	4,648	4,507	4,929	5,167	5,314	5,347
Net annual growth	4,166	4,541	5,098	6,337	6,407	6,697	6,845	6,865	6,815
Inventory	380,795	389,825	383,386	380,379	392,973	401,675	413,872	423,415	432,357
Hardwoods									
Sawtimber supplies	15	19	12	17	14	19	20	22	22
Net annual growth	98	107	143	255	280	295	299	302	297
Inventory	8,983	9,633	9,964	9,790	12,341	12,855	13,481	14,028	14,541
Pacific Coast									
Softwoods									
Sawtimber supplies	22,421	22,241	24,912	25,152	21,983	21,134	20,489	19,960	19,567
Net annual growth	10,029	11,534	14,540	15,110	15,168	15,777	16,418	16,887	17,111
Inventory	1,430,096	1,327,344	1,239,606	1,167,503	978,446	911,742	864,954	830,138	805,466
Hardwoods									
Sawtimber supplies	126	199	317	361	420	451	462	451	435
Net annual growth	1,040	1,358	1,625	1,568	937	673	508	399	330
Inventory	34,527	42,410	51,167	47,539	50,122	51,211	50,838	49,522	47,930
United States									
Softwoods									
Sawtimber supplies	38,741	38,143	46,097	49,954	48,115	50,454	52,517	54,262	55,551
Net annual growth	30,170	36,976	44,272	49,692	52,812	55,875	57,935	59,016	59,197
Inventory	2,066,203	2,032,757	2,001,673	1,985,408	1,921,103	1,951,140	1,996,665	2,040,293	2,078,748
Hardwoods									
Sawtimber supplies	11,924	10,933	12,414	12,902	14,713	18,460	21,889	25,365	27,513
Net annual growth	15,717	18,194	21,969	24,929	26,444	26,610	26,127	25,409	24,441
Inventory	446,018	483,700	536,706	593,532	740,964	824,376	874,293	890,263	877,842

[1]Data for the Great Plains States—Kansas, Nebraska, North Dakota, and eastern South Dakota included in the North.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

harvest of roundwood products from growing stock or sawtimber (tables 7.5 nd 7.6). It was assumed that timber harvest would continue to account for the great bulk of timber removals, thus the projected trends in removals, in total and by softwoods and hardwoods, section and ownership, are similar to those described above for timber supplies from growing stock and sawtimber. Logging residues and other removals also affect timber removals and these components show different trends.

In general, the volume of softwood logging residues is expected to decline over the projection period because of expected improvements in utilization associated with rising prices and increasing competition for timber. Declines in the harvests of old-growth timber stands, which contain substantial volumes of cull timber, will also reduce logging residues in the West.

There is an increase in the volume of hardwood logging residues in the early decades of the projection period, a response to the large increase in harvests. After 2010, however. they decline as improvements in utilization more than offset the increase in harvests.

There is a large increase in the volume of other removals between 1976 and 1990. Most of this is softwood and

Table 7.9—*Roundwood supplies, net annual growth, and growing stock inventory in the United States, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	963	1,641	1,923	1,886	2,157	2,392	2,553	2,681	2,765
Net annual growth	1,663	1,999	2,361	2,465	2,710	2,871	2,986	3,057	3,073
Inventory	204,350	213,604	211,705	207,698	189,985	192,619	195,889	198,802	201,445
Hardwoods									
Roundwood supplies	100	97	123	101	132	163	194	221	246
Net annual growth	396	508	569	651	631	560	484	433	397
Inventory	13,252	16,751	18,575	20,751	27,151	31,350	34,470	36,676	38,137
Other public									
Softwoods									
Roundwood supplies	416	562	706	805	908	948	991	1,026	1,060
Net annual growth	678	892	1,025	1,077	1,160	1,206	1,228	1,236	1,239
Inventory	49,918	49,533	50,421	50,946	54,315	56,721	59,212	61,609	63,885
Hardwoods									
Roundwood supplies	122	115	156	177	232	271	307	339	367
Net annual growth	543	684	796	879	726	589	496	444	413
Inventory	14,645	18,805	21,930	24,557	29,978	33,904	36,331	37,866	38,783
Forest industry									
Softwoods									
Roundwood supplies	2,796	2,289	2,896	3,417	3,208	3,167	3,181	3,218	3,262
Net annual growth	1,872	2,326	2,611	2,866	3,084	3,200	3,249	3,267	3,270
Inventory	77,280	75,895	74,887	74,382	72,119	74,079	76,359	78,430	80,027
Hardwoods									
Roundwood supplies	421	434	488	473	770	974	1,148	1,331	1,458
Net annual growth	688	830	1,058	1,207	1,254	1,237	1,204	1,187	1,176
Inventory	20,025	24,770	28,494	31,884	40,660	44,999	46,829	46,918	45,483
Farmer and other private									
Softwoods									
Roundwood supplies	3,361	2,836	3,177	3,403	4,097	4,551	4,883	5,109	5,247
Net annual growth	3,470	4,326	5,243	5,877	6,285	6,193	6,010	5,822	5,642
Inventory	93,398	101,790	112,777	122,753	152,103	166,797	177,091	183,473	186,895
Hardwoods									
Roundwood supplies	2,718	2,405	2,624	2,543	3,752	4,618	5,416	6,240	6,789
Net annual growth	4,602	5,128	6,096	6,643	6,820	6,460	6,070	5,786	5,631
Inventory	130,526	146,635	161,638	177,997	217,848	236,626	244,750	243,047	234,905
United States									
Softwoods									
Roundwood supplies	7,536	7,329	8,701	9,511	10,369	11,058	11,607	12,034	12,334
Net annual growth	7,684	9,543	11,239	12,285	13,240	13,470	13,472	13,382	13,224
Inventory	424,946	440,822	449,790	455,779	468,521	490,216	508,550	522,314	532,252
Hardwoods									
Roundwood supplies	3,362	3,052	3,391	3,295	4,886	6,027	7,065	8,132	8,861
Net annual growth	6,229	7,149	8,519	9,380	9,431	8,846	8,253	7,850	7,618
Inventory	178,448	206,961	230,637	255,189	315,637	346,879	362,381	364,507	357,308

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

reflects the diversion of commercial timberland to other uses such as wilderness. The other removal projections from 1990 on do show a declining trend. This reflects the assumption on changes in commercial timberland area shown in table 7.1.

A comparison of timber removals with timber inventories provides a rough indication of the degree to which the existing timber resource is being utilized. As shown in the tabulation (right), there are substantive differences in removal rates among the sections of the country and between softwoods and hardwoods.

Region	*Growing stock removals as a percent of inventories* — *Softwoods* 1976	*Softwoods* 2030	*Hardwoods* 1976	*Hardwoods* 2030
North	1.6	1.4	1.5	1.7
South	4.6	4.0	2.0	3.8
Rocky Mountains	0.9	1.2	0.1	0.1
Pacific Coast	1.9	2.1	0.9	0.9
Total U.S.	2.2	2.4	1.6	2.4

Trends In Net Annual Growth. As described in chapter 6 of this study (see pages 135 to 138), there have been substantial increases in net annual tim-

Table 7.10—*Sawtimber supplies, net annual growth, and sawtimber inventory in the United States by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	6,078	10,360	12,225	11,690	12,268	13,355	13,953	14,369	14,563
Net annual growth	6,915	8,154	10,175	11,030	11,859	12,915	13,739	14,278	14,504
Inventory	1,047,945	1,066,573	1,033,776	1,009,287	887,577	870,746	861,283	854,526	850,223
Hardwoods									
Sawtimber supplies	343	339	442	478	372	487	609	728	842
Net annual growth	870	1,178	1,315	1,712	1,710	1,713	1,684	1,679	1,690
Inventory	30,683	37,884	42,140	49,099	64,664	76,222	86,513	95,535	103,399
Other public									
Softwoods									
Sawtimber supplies	2,326	3,322	4,297	4,971	4,777	4,833	4,957	5,049	5,143
Net annual growth	3,293	3,935	4,444	4,757	5,148	5,503	5,740	5,859	5,906
Inventory	254,771	240,564	236,372	235,174	240,645	245,421	253,008	261,919	271,435
Hardwoods									
Sawtimber supplies	358	314	497	623	689	835	983	1,129	1,270
Net annual growth	1,123	1,575	1,845	2,107	1,941	1,904	1,885	1,880	1,867
Inventory	29,171	36,832	44,369	50,925	64,008	75,095	84,627	93,036	100,279
Forest industry									
Softwoods									
Sawtimber supplies	16,068	13,014	16,264	18,962	14,914	13,989	13,489	13,256	13,196
Net annual growth	7,962	9,396	10,675	11,747	11,908	12,405	12,802	13,100	13,269
Inventory	410,284	363,940	335,200	314,276	268,435	256,845	253,612	255,939	261,279
Hardwoods									
Sawtimber supplies	1,463	1,530	1,663	1,791	2,484	3,204	3,799	4,381	4,705
Net annual growth	1,713	2,118	2,930	3,303	3,908	3,998	3,933	3,813	3,617
Inventory	52,749	61,131	73,206	80,648	105,169	117,861	123,200	122,664	116,566
Farmer and other private									
Softwoods									
Sawtimber supplies	14,268	11,447	13,311	14,332	16,155	18,278	20,118	21,588	22,650
Net annual growth	12,000	15,490	18,977	22,157	23,897	25,052	25,653	25,779	25,518
Inventory	353,203	361,680	396,324	426,671	524,446	578,129	628,763	667,910	695,811
Hardwoods									
Sawtimber supplies	9,760	8,751	9,812	10,010	11,167	13,935	16,498	19,127	20,696
Net annual growth	12,011	13,323	15,880	17,806	18,886	18,995	18,626	18,037	17,267
Inventory	333,415	347,853	376,991	412,859	507,123	555,198	579,953	579,028	557,598
United States									
Softwoods									
Sawtimber supplies	38,741	38,143	46,097	49,954	48,115	50,454	52,517	54,262	55,551
Net annual growth	30,170	36,976	44,272	49,692	52,812	55,875	57,935	59,016	59,197
Inventory	2,066,203	2,032,757	2,001,673	1,985,408	1,921,103	1,951,140	1,996,665	2,040,293	2,078,748
Hardwoods									
Sawtimber supplies	11,924	10,933	12,414	12,902	14,713	18,460	21,889	25,365	27,513
Net annual growth	15,717	18,194	21,969	24,929	26,444	26,610	26,127	25,409	24,441
Inventory	446,018	483,700	536,706	593,532	740,964	824,376	874,293	890,263	877,842

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

ber growth since 1952. In total, for example, net annual growth of softwood growing stock rose from 7.7 to 12.3 billion cubic feet while that of hardwoods climbed from 6.2 to 9.4 billion cubic feet. Net annual growth of softwood sawtimber rose from 30.2 to 49.7 and hardwood from 15.7 to 24.9 billion board feet.

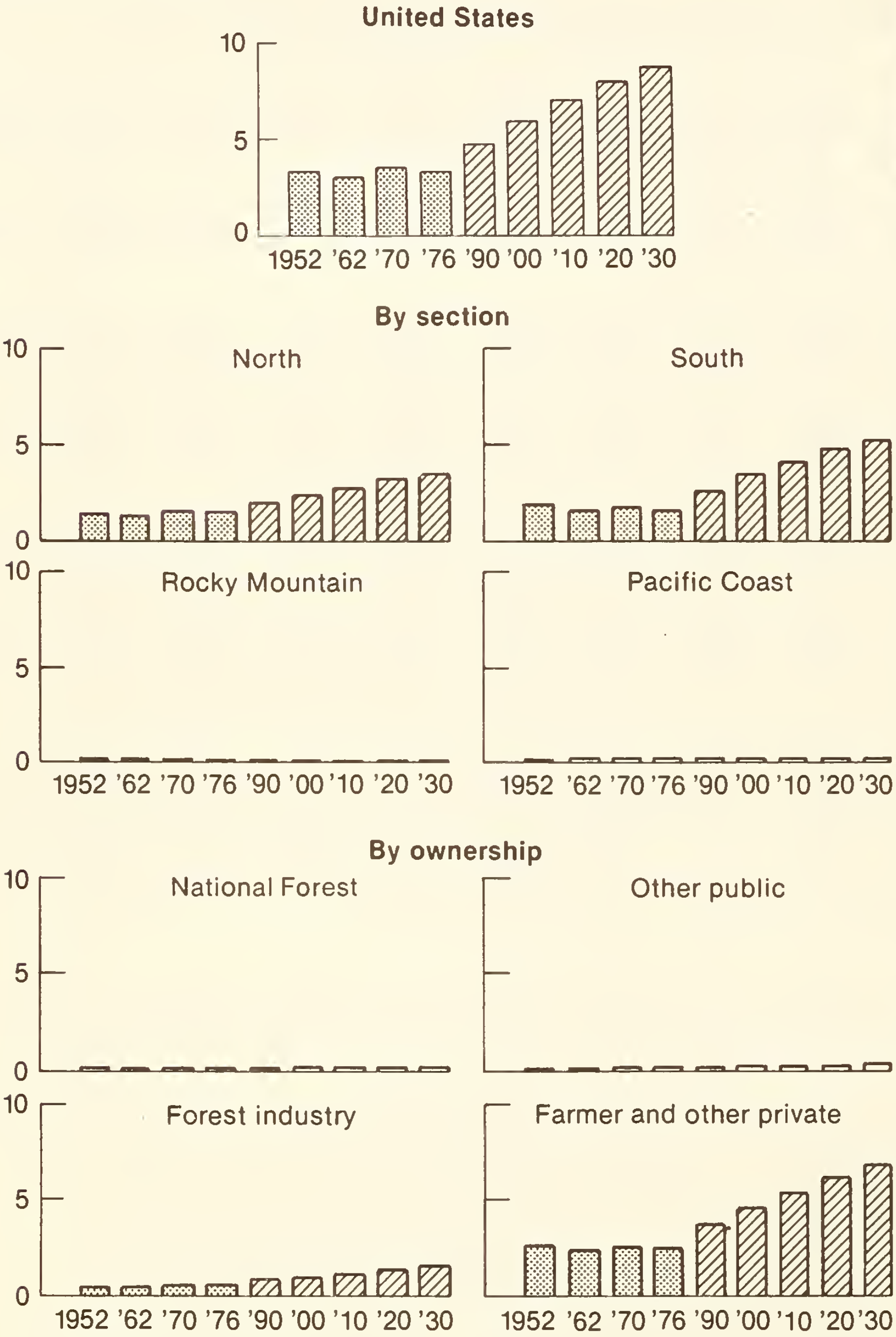
These trends are not expected to continue through the projection period. Net annual growth of softwood growing stock is projected to increase at progressively slower rates to 13.5 billion cubic feet in 2010 and decline slightly thereafter, to a 13.2 billion cubic feet in 2030 (tables 7.5 and 7.6). Net annual growth of softwood sawtimber follows a similar trend but it is still increasing slowly beyond 2020.

The projected trends in net annual softwood growth vary among sections and ownerships. The trends for the North, South, and Rocky Mountain sections are similar to the national trends although more of the decline that takes place in growing stock in the last decades of the projection period is in the South. Net annual softwood growth in the Pacific Coast section continues to increase through 2030. With respect to ownerships, net annual growth increases on the National Forests, other public and forest industry ownerships — the projected decline takes place on the farmer and other private ownerships.

Figure 7.4

Hardwood Roundwood Harvests, 1952-76, with Projections of Supplies to 2030

Billion cubic feet



In most sections of the country, there is an increase in net annual growth in the first part of the projection period, then a decline. The decline largely reflects overstocking.

These trends have varying causes. The projected increases in the net annual softwood growth on the Pacific Coast largely reflect the effects of replacing the old-growth forests on the National Forest and other public ownerships, where net annual growth is low, with young forests where it is high. Projected net annual softwood sawtimber growth on the forest industry ownerships in the Pacific Coast declines through the projection period because of reduction in timber inventories. This is discussed further in a following section.

Inventory accumulations to the point of overstocking are the cause of the declines in projected net annual softwood growth on all ownerships in the North, on public lands in the South, and on most ownerships in the Rocky Mountains. Overstocking leads to reduced gross growth and a small increase in mortality especially among small diameter trees. The major cause of the projected reduction in projected net annual softwood growth in the South is the reversion of large areas of harvested pine stands back to hardwoods on the farmer and other private ownerships. This is also discussed further in a following section.

The projected trends for net annual growth of hardwoods are roughly the same as those for softwoods though with different timing. Hardwood growing stock net annual growth peaks at 9.4 billion cubic feet in 1990 and drops to 7.6 billion cubic feet in 2030, 19 percent below the 1976 level. Net annual growth of hardwood sawtimber continues to increase for a longer period, but after a top of 26.6 billion board feet in 2000, it falls to 24.4 billion board feet in 2030.

The general trends for hardwoods in the sections of the country are similar to those shown for the nation. There are some differences among ownerships —most of the drop in net annual growth occurs on the farmer and other private ownerships.

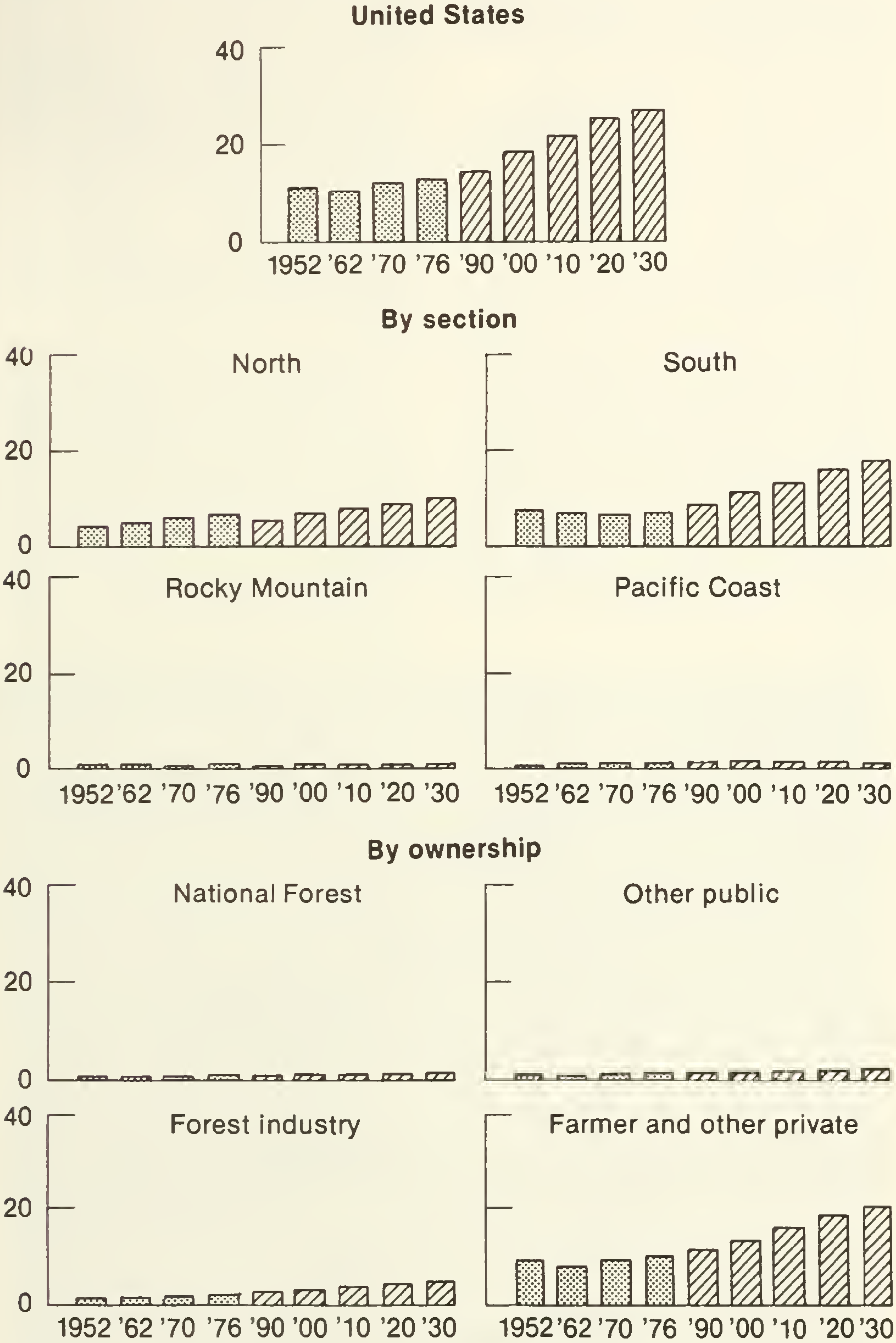
The peaking and subsequent decline in projected net annual growth of hardwoods in the eastern sections are due to overstocking. Hardwood inventories in these sections simply cannot continue to increase without eventually having an adverse impact upon growth.

Net annual growth of growing stock expressed as a percentage of inventory (growth percentage) was 2.7 percent in 1976 for softwoods and 3.7 percent for hardwoods. The softwood growth percentage is lower than hard-

Figure 7.5

Hardwood Sawtimber Harvests, 1952-76, with Projections of Supplies to 2030

Billion board feet, International ¼-inch log rule



woods because of the influence of the old-growth forests in the Pacific Coast. The softwood growth percentage is projected to drop slightly, falling to 2.5 percent by 2030. The hardwoods show a much more pronounced drop to 2.1 percent by 2030. The reasons for these changes are the same as those causing the changes in net annual growth; the growth percentages, however, are more sensitive to those factors.

There were considerable variations in the net annual growth percentages among regions and ownerships. The South had the highest softwood growing stock percentage in 1976—6.3 percent—but this is projected to decline by 2030 to 4.2 percent. The 1976 softwood growing stock growth percentage in the Pacific Coast was only 1.3 percent. Even though it is projected to increase, the influence of old-growth inventory on public lands holds it down to 2.2 percent in 2030, about half of the value in the South.

Trends in Mortality. Between 1952 and 1976, mortality of softwood growing stock dropped from 2.6 to 2.3 billion cubic feet and that of sawtimber from 11.9 to 8.8 billion board feet (tables 7.5 and 7.6). This was caused by a rather substantial decrease in mortality on the Pacific Coast and a small one in the Rocky Mountains. These declines primarily reflected the harvesting and associated reduction of the inventory volumes of timber in old-growth stands where mortality is high. Increased protection from destructive agents such as fire, insects, and disease may have also contributed to the reduction. In the North and South, softwood mortality rose, a natural result of the increasing inventories and the associated tree suppression taking place in the timber stands in those sections.

Softwood growing stock mortality is projected to rise to 2.9 billion cubic feet in 2030, 24 percent above 1976. Softwood sawtimber mortality rises to 10.0 billion board feet in 2030, some 14 percent more than in 1976. Most of the increase in projected softwood mortality is in the South and North and reflects the same forces that have caused the rise in mortality in those sections that took place between 1952 and 1976.

Hardwood growing stock mortality increased from 1.2 to 1.6 billion cubic feet between 1952 and 1976. This upward trend is projected to continue during most of the projection period. This too is a response to rising inventories and increased stand densities.

Although the projected mortality —softwoods and hardwoods—is substantive in terms of volume, it does not represent much of an economic potential for harvest. Most of the mortality will be in suppressed understory trees scattered through the stands. Even with rising stumpage prices, it will probably not be feasible to salvage much of this material.

Trends in Inventories. Timber inventories are often considered an indicator of the capability of the forests to support timber harvests. Although it is simplistic to use inventories alone as an index of harvesting capability, inventories have had a major impact upon

timber harvests and are likely to continue to do so. The composition of inventories by species and size or age class also has an important impact upon the projected supplies shown in this study. Management intensification can in time alter the size and composition of the inventory but this will take several decades.

Recent trends in timber inventories by softwoods and hardwoods, section of the country and ownerships are described in some detail in chapter 6, pages 128 to 129. As indicated in that discussion, the inventories of softwood growing stock increased slowly between 1952 and 1977 largely in response to accumulations of inventories in the North and South. Softwood sawtimber inventories fell slightly as a result of the reduction in inventories in the Pacific Coast section associated with the harvest of old-growth stands. There was also a decline in the Rocky Mountains after 1962. Softwood inventories in the other sections increased, especially in the South, where they rose about 70 percent.

The projections show increases in both softwood growing stock and sawtimber inventories (tables 7.5 and 7.6). Softwood growing stock inventories move up from 456 billion cubic feet in 1977 to 532 billion in 2030, a rise of 17 percent. Most of the increase takes place before 2010. After an initial decline, sawtimber inventories rise slowly to 2,079 billion board feet in 2030, a level 5 percent above 1977.

As in the case of nearly all components of the timber resource, there are significant differences in softwood inventory trends among sections and ownerships (tables 7.7—7.10). Inventories of both growing stock and sawtimber rise very rapidly in the North and South. The increase is especially large in the South—sawtimber inventories in this section, for example, move up from 341 billion board feet in 1977 to 638 billion in 2030. There is also a small increase in the Rocky Mountain section. However, inventories in the Pacific Coast section decline, in the case of sawtimber, from 1,168 billion board feet in 1977 to 805 billion in 2030.

There are large increases in projected softwood inventories on farmer and other private ownerships and smaller increases on the other public ownerships. Growing stock inventories on the National Forests and forest industry ownerships show an initial drop, then rise to levels close to or above those in 1976. In contrast, there are substantial decreases in the sawtimber inventories on National Forest and forest industry ownerships. This reduction is concentrated in the Pacific Coast section and is the result of the harvest of old-growth stands.

The trends outlined above have major impacts on the distribution of the softwood inventory, by ownership, as indicated in the tabulation below:

Ownership	*Ownership distribution of softwood sawtimber inventory (Percent)* 1977	2030
National Forests	50.8	40.9
Other public	11.8	13.1
Forest industry	15.8	12.6
Farm and miscellaneous Private	21.5	33.5

Although the National Forests will have the largest softwood sawtimber inventory in 2030 (reflecting the volumes in residual old-growth stands), the National Forest share of the total drops markedly as does that for forest industry. The share in farmer and other private ownerships increases substantially. There is a related shift in timber volumes from the Pacific Coast to the South.

The hardwood growing stock inventory increased much more than the softwood inventory between 1952 and 1977, from 178.4 to 255.2 billion cubic feet. The hardwood sawtimber inventory also rose, although less rapidly, going up from 446.0 to 593.5 billion board feet.

The inventory of hardwood growing stock is projected to rise 40 percent by 2030 to 357.3 billion cubic feet, and hardwood sawtimber by 48 percent to 877.8 billion board feet. The rates of increase in inventories in these projections are considerably below the rates of accumulation in the 1952 to 1977 period. The slowdown is caused by a reduction in net annual growth resulting from overstocking and increased timber removals from inventories.

Hardwood inventories — growing stock and sawtimber—increase in all sections during the early decades of the projection period. There is a later decline in the South as a result of continuing increases in removals and in the Pacific Coast section where the conversion of second-growth hardwood stands to softwoods is expected to result in some reduction. Inventories also rise on all ownerships through 2010 with the largest part on the farmer and other private ownerships. There is some decline on the private ownerships in the last decades of the projection period.

Unlike softwoods, the sectional distribution of the projected hardwood sawtimber inventories between the North and South is almost the same in 2030 as it was in 1977, each with a little less than half of the total. The ownership distribution is also about the same. The farmer and other private ownerships continue to hold about two-thirds of the hardwood sawtimber inventories. As described in the discussion of national totals, the projection trends vary by section of the country and ownership. These trends are discussed in further detail below for each section—North, South, Rocky Mountains, Pacific Coast and Alaska.

Projected Changes in Timber Resources in the North

Over a quarter of the land area in the North is in forests. Nearly all of the forest land or about 166 million acres is commercial timberland. This land (and the timber inventories it supports) was the source of nearly half of the hardwood timber harvested in 1976 and about 5 percent of the softwood harvested.

The North also has about 53 percent of the Nation's population. Thus much of the forest land is in close proximity to large numbers of people and it is used for a wide range of outdoor recreation activities.

Trends in Commercial Timberland Area. In the decade following 1952, there was a small increase in the commercial timberland area in the North (table 7.11). After 1962, a slow downward trend began and by 1977 the area was reduced some 4.8 million below 1962. There were different trends in the Northeast and North Central region. This is largely the result of clearing for crop and pasture land and an expansion in urban areas.

The projections show a decline of 7.6 million acres, or 4.6 percent, in the commercial timberland area in the North between 1977 and 2030. Both northern regions share in the projected loss, although it is less in the Northeast (3.1 million acres) than in the North Central region (4.5 million acres). The projected losses of commercial timberland result from causes such as the spread of urban areas, clearing of rights of way for roads and utility lines and, in some places, clearing for crop and pasture lands.

Almost three-fourths of the timberland in the North was held by farmer and other private owners in 1977 and almost all of the projected decline in commercial timberland area is on these ownerships. The acreage in National

Table 7.11—*Area of commercial timberland in the North, by region and ownership, 1952, 1962, 1970, and 1977, with base level projections to 2030*

(Million acres)

Item	1952	1962	1970	1977	Projections 1990	2000	2010	2020	2030
Northeast									
National Forest	2.1	2.1	2.2	2.0	2.0	2.0	2.1	2.1	2.1
Other public	5.1	5.4	5.6	6.1	6.1	6.0	6.0	6.0	6.0
Forest industry	10.1	10.1	12.2	12.9	12.9	12.9	12.9	12.8	12.8
Farmer and other private	55.6	60.3	58.0	56.3	55.7	55.2	54.6	53.9	53.3
Total	73.0	77.9	78.0	77.4	76.7	76.2	75.5	74.9	74.3
North Central									
National Forest	8.2	8.1	8.3	7.8	7.8	7.9	7.9	7.9	7.9
Other public	15.9	14.7	14.5	14.6	14.6	14.6	14.7	14.7	14.7
Forest industry	3.9	3.9	5.2	5.0	5.4	5.6	5.8	5.9	6.0
Farmer and other private	67.8	66.2	62.6	61.4	59.7	58.2	57.1	55.8	55.6
Total	95.8	93.0	90.5	88.7	87.5	86.3	85.4	84.2	84.2
Total North									
National Forest	10.3	10.3	10.5	9.8	9.8	9.9	9.9	10.0	10.0
Other public	21.0	20.1	20.1	20.7	20.7	20.7	20.6	20.7	20.6
Forest industry	14.0	14.0	17.4	17.9	18.3	18.5	18.7	18.7	18.8
Farmer and other private	123.5	126.5	120.6	117.7	115.4	113.4	111.6	109.8	109.0
Total	168.8	170.9	168.6	166.1	164.2	162.5	160.9	159.1	158.5

Note: Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, and the projection years are as of January 1.

Harvests of hardwood sawtimber in the North rose about 50 percent between 1952 and 1976. The projections show that harvests can be increased by another 50 percent by 2030.

Forest and other public ownerships is projected to remain about the same, while that in forest industry ownership increases slightly. The expansion in the area in forest industry ownerships results from purchase of land from the farmer and other private ownerships.

Although the total projected decline in the area of commercial timberland in the North is relatively small, the figures may well understate the impacts on future timber supplies. Because of the large population, constraints associated with the use of commercial timberland for purposes other than timber production appear to be greater in the North than in other sections. As these goals become increasingly important and ownership shifts from farmers to people whose homes are in urban areas and who may have less need for income from timber, harvests may be increasingly constrained.

Trends In Timber Supplies. Although there has been growing use of the commercial timberland in the North for recreation and other related purposes, timber harvests have been rising since 1962 (tables 7.12 and 7.13). Hardwood roundwood harvests, which composed nearly three quarters of total roundwood harvests in 1976, rose from 1.3 billion cubic feet in 1962 to 1.5 billion cubic feet in 1976 (fig. 7.6). Harvests of sawtimber products in this same pe-

Table 7.12—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the North, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock									
Roundwood products	518	438	480	556	738	828	893	944	984
Logging residues	67	54	58	69	73	68	61	56	52
Other removals[1]	50	48	58	80	46	60	71	71	52
Total	635	540	597	705	856	956	1,025	1,071	1,088
Net annual growth	993	1,234	1,362	1,600	1,722	1,660	1,554	1,452	1,374
Mortality	217	295	333	328	422	481	525	554	574
Roundwood supplies[2]									
From growing stock	518	438	480	556	738	828	893	944	984
From other sources[3]	79	63	69	80	82	92	99	105	109
Total	596	501	549	636	820	921	993	1,050	1,094
Inventory of growing stock[4]	27,629	34,332	39,661	44,574	56,996	65,069	71,425	76,111	79,676
HARDWOODS									
Removals from growing stock									
Roundwood products	1,057	1,094	1,290	1,254	1,680	1,998	2,314	2,638	2,878
Logging residues	198	198	232	260	296	304	300	284	250
Other removals[1]	223	247	355	440	235	285	297	307	198
Total	1,479	1,538	1,876	1,953	2,211	2,588	2,911	3,229	3,326
Net annual growth	2,992	3,507	3,926	4,192	4,305	3,963	3,623	3,386	3,282
Mortality	518	694	819	890	1,133	1,254	1,326	1,345	1,348
Roundwood supplies[2]									
From growing stock	1,057	1,094	1,290	1,254	1,680	1,998	2,314	2,638	2,878
From other sources[3]	324	235	174	248	344	424	491	579	632
Total	1,381	1,329	1,464	1,502	2,024	2,422	2,805	3,217	3,510
Inventory of growing stock[4]	83,645	103,071	116,201	128,571	161,994	180,021	191,074	195,797	197,201

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

riod grew from 4.4 billion board feet to 6.2 billion.

Trends in hardwood harvests by region and ownerships have been similar to those of the section (Append. 4, tables 4.1-4.8). About three-fifths of the hardwood harvests in 1976 came from the North Central region and two-fifths from the Northeast. About four-fifths of the 1976 hardwood harvests in the North came from farmer and other private ownerships and nearly half of the remainder from forest industry ownerships (tables 7.14 and 7.15).

Projected hardwood roundwood supplies in the North more than double by 2030 rising to 3.5 billion cubic feet. The hardwood sawtimber product supplies go up from 6.2 to 9.7 billion board feet, an increase of 56 percent.

Softwood harvests by section, region, and ownerships have followed about the same trends as hardwoods. However, a much larger proportion of the softwood harvest came from the farmer and other private and forest industry ownerships.

Softwood roundwood supplies are projected to increase 72 percent between 1976 and 2030 from 0.6 to 1.1 billion cubic feet. Softwood product supplies are projected to rise by 53 percent, from 2.2 to 3.3 billion board feet.

Trends in projected hardwood supplies in the two timber supply regions in the North are quite similar to those in the section. Hardwood roundwood supplies in both regions are projected to more than double by 2030. Softwood supplies, however, increase much more rapidly in the North Central region. Thus the North Central region will become more important as a source of softwood timber although most of the supply, three-fifths in 2030, will still come from the Northeast.

There are substantial percentage increases in timber supplies on all major ownerships in the North. The farmer and other private ownerships are the source of nearly three quarters of the projected supplies through the projection decades. Although these ownerships continue as the predominant source of supply, there may be growing constraints on harvests associated with nontimber ownership objectives. A number of studies in the North show that these owners seldom cite timber production as the primary reason for owning forest land.[7]

[7] A few of the more recent studies are:
Kingsley, Neal P. The forest land owners of New Jersey. U.S. Dep. Agric.,

Table 7.13—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the North, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber									
Roundwood products	1,624	1,271	1,784	1,928	1,997	2,271	2,512	2,747	2,976
Logging residues	60	46	63	65	79	75	69	65	63
Other removals[1]	130	123	174	230	133	174	205	219	156
Total	1,814	1,439	2,021	2,223	2,209	2,520	2,786	3,032	3,195
Net annual growth	2,337	2,920	3,498	4,077	4,237	4,579	4,845	5,041	5,197
Mortality	365	495	603	582	769	894	1,020	1,144	1,268
Roundwood supplies[2]									
From sawtimber	1,624	1,271	1,784	1,928	1,997	2,271	2,512	2,747	2,976
From other sources[3]	222	159	248	241	223	254	281	307	333
Total	1,846	1,430	2,033	2,169	2,220	2,525	2,793	3,055	3,309
Inventory of sawtimber[4]	58,756	69,876	82,877	96,501	122,525	142,413	162,646	182,593	202,649
HARDWOODS									
Removals from sawtimber									
Roundwood products	3,729	3,998	5,298	4,996	4,548	5,403	6,272	7,222	7,932
Logging residues	312	362	431	334	321	329	326	311	276
Other removals[1]	565	572	870	859	643	777	793	828	523
Total	4,606	4,932	6,600	6,190	5,512	6,509	7,391	8,361	8,731
Net annual growth	6,825	8,355	9,417	9,809	9,936	10,050	10,052	10,039	10,081
Mortality	934	1,265	1,404	1,503	1,816	2,016	2,169	2,271	2,341
Roundwood supplies[2]									
From sawtimber	3,729	3,998	5,298	4,996	4,548	5,403	6,272	7,222	7,932
From other sources[3]	362	415	563	1,192	931	1,146	1,331	1,585	1,742
Total	4,090	4,413	5,861	6,188	5,480	6,549	7,603	8,807	9,674
Inventory of sawtimber[4]	189,872	212,277	236,784	262,517	326,105	363,247	391,946	410,969	424,684

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Recent surveys of private non-industrial forest landowners in nine Northeastern States, for example, showed that only 10 percent of their commercial timberland area was held primarily for timber production. Recreational uses and speculation on land value appreciation were listed as much more common reasons for owning timberland. The timberland is also often simply part of a parcel purchased for other purposes such as a home site.

Non-timber uses may be unduly emphasized in the ownership surveys in the North because of poor markets and low stumpage prices that exist for much of the hardwood timber. The opportunity cost of not harvesting this timber or delaying harvest under such circumstances is lower than in areas where stumpage prices are high. Relative closeness to the large population centers, especially in parts of the heavily populated Northeast, may be another factor.

Although owner objectives constrain the use of the commercial timberland in farmer and other private ownerships for timber production, it seems likely that nearly all of the timber that is produced will sooner or later be used for industrial products or as fuelwood. Many landowners harvest timber, even though this may not be compatible with previously stated objectives for owning the land.[8] Tenure is often less than 10 years, and it is highly likely that the timber will be owned sooner or later by someone who will be willing to harvest. Changes in financial needs also fre-

Forest Serv., Res. Bull. NE-39, 24 p. 1975.

Marler, R. L. and P. F. Graves. A new management rationale for small forest land owners. Applied Forestry Research Institute, Res. Rep. 17. State Univ. of N.Y., Syracuse. 17 p. 1974.

Beasley, R. I. and I. I. Holland. Predicting the success of alternate government incentives programs. Science Series, Monograph 3. Southern Ill. Univ., Carbondale, Ill. 251 p. 1973.

[8] Studies in which farmer and other private landowners were requestioned about their past action and this action was compared with their earlier statements of reasons for ownership include:

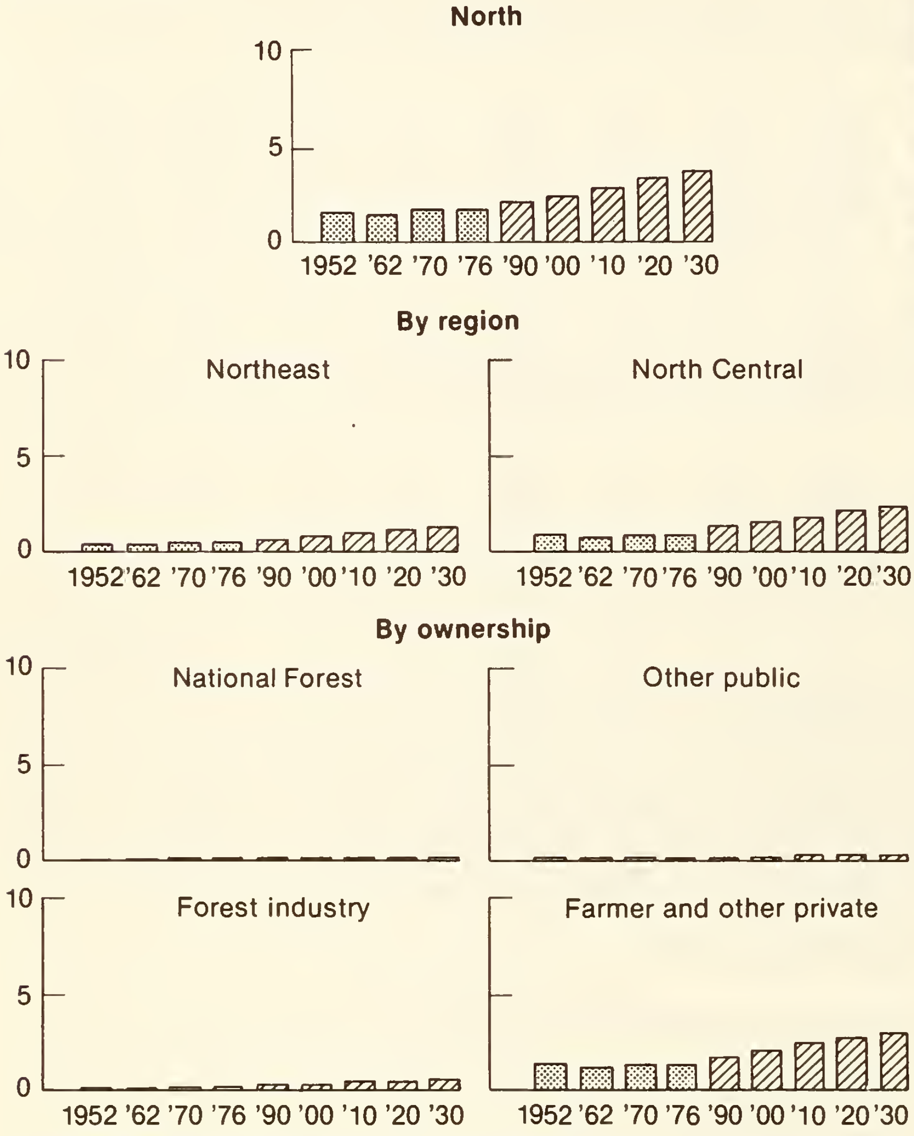
Stone, Robert N. A comparison of woodland owner intent with woodland practices in Michigan's Upper Peninsula. Ph.D. Diss., Univ. of Minn. 115 p. 1969.

Turner, Brian J., James C. Finnley, and Neal P. Kingsley. How reliable are woodland owner's intentions. J. Forestry 75(8):498–499. 1977.

Figure 7.6

Hardwood Roundwood Harvests in the North, 1952-76, with Projections of Supplies to 2030

Billion cubic feet



quently change owner attitudes toward the harvest and sale of timber.

Forest industry ownerships also continue to account for about the same proportion of roundwood supplies in 2030 as in 1976, around 15 percent of the total.

The other public ownerships, many of which are State lands in the North Central region, were the source of 7 percent of the roundwood harvested in the North in 1976. Most of the land in this class came into State and county ownership as tax delinquent lands in the 1930's. These lands, under management for the past four decades, are expected to contribute somewhat more to the timber supplies in the North over the projection period.

Much of the National Forest land in the North was also acquired during the 1930's as land that was then recognized as being submarginal for crop land. Timber inventories on these lands have also been built up since they were acquired and further and substantial additions are expected. Further increases in timber supplies are also expected although the proportion of the total roundwood supplies shows a slight decrease.

Recreational uses, such as hunting, and speculation on land value appreciation are common reasons for owning timberland, more common than timber production in many areas.

Supply response on the public ownerships are constrained by the emphasis on non-timber resources and uses. On the National Forests in the North, for example, 22 perent of the commercial timberland was in special, marginal, or unregulated land classes [9] in 1976. All these categories have some non-timber or environmental constraints on timber harvesting. The remaining 78 percent is in the standard class, but even on these lands there are constraints on harvesting relative to those in industry and the farmer and other private ownerships.

[9] The classes of land used on the National Forests are defined as follows:

Standard includes regulated commercial land on which crops of industrial wood can be grown with assured protection of the forest resources.

Special includes regulated commercial forest land where specifically designed treatment of the timber resource is needed to meet management goals other than timber production (to enhance an area for recreation purposes for example).

Marginal includes regulated commercial forest land where it is silviculturally desirable to harvest timber to meet management objectives, but because of excessive development costs, low product values, or resource protection constraints, opportunities for harvest are limited or sporadic in nature. These lands are not marginal from the standpoint of timber productivity, which is an idea sometimes misapplied to them.

Unregulated includes limited areas of commercial forest land that are not organized for timber production under sustained yield principles. These lands basically are comprised of experimental forests (maintained for research purposes), recreation and administrative sites, or tracts of timber so isolated that regularly scheduled timber harvests seem improbable in the foreseeable future.

Of the timber harvested in the North in 1976, about 80 million cubic feet of softwood and 248 million feet of hardwood roundwood came from nongrowing stock sources, such as fence rows and urban areas, and salvable dead and rough and rotten trees. By 2030, these volumes are projected to increase to 109 and 632 million cubic feet, respectively. However, the great bulk of the supply, 84 percent of the total in 2030, will still come from growing stock inventories.

The proportion of the supplies of sawtimber products coming from nongrowing stock sources and the projected trends in supplies from this source are very similar to those for roundwood.

Trends in Timber Removals. Because timber products represent by far the largest component of timber removals from growing stock and sawtimber, past and projected trends in removals in the North are similar to the trends for roundwood harvests and projected supplies discussed above. Roundwood products increase from 68 percent of the removals of growing stock in 1976 to 87 percent in 2030.

The rise in the importance of products as a component of timber removals is due to a decline in the volume of logging residues and other removals. Logging residues from growing stock and sawtimber, and softwood and hardwoods, show a fairly steady downward trend over the projection period—a response to expected improvements in utilization.

Other removals, although fluctuating by decade in response to the projected losses in commercial timberland area, are by 2030, much below the levels of 1976.

Removal trends, in total and by component, in the Northeast and North Central regions, are similar to those for the section (Append. 4, tables 4.1-4.8). Growing stock removals in the Northeast are projected to increase from 1.3 billion cubic feet in 1976 to 1.9 billion cubic feet in 2030 and from 1.4 to 2.5 billion cubic feet in the North Central region.

In 1976, removals of growing stock as a percentage of timber inventories in the North were 1.5 percent. This is less than half of the rate in the South where markets for timber are more active. The 1976 removal percentages were 1.7 percent for both farmer and other private and forest industry ownerships. The National Forest rate was lower at 1.0 percent, and the other public owner class was only 0.9 percent, about half of that achieved on the private lands.

The growing stock removal percentage in the North is projected to rise from 1.5 percent in 1976 to 1.6 percent in 2030. The increase is on the farmer and other private and other public ownerships, projected removals as a percent of inventories decline on the other major ownerships. The drop is largest on the National Forests. This in part reflects the use of the land and forests on these ownerships for purposes which in some degree constrain timber harvests.

Trends in Net Annual Growth. Net annual growth of hardwood growing stock in 1976 was 4.2 billion cubic feet, about 40 percent above the 1952 level. Net annual softwood growth in the period showed a 61 percent rise from 1.0 to 1.6 billion cubic feet. Net annual growth is projected to continue to rise for both softwoods and hardwoods between 1976 and 1990. After 1990, however, growing stock inventories increase to the point where net annual growth begins to decline as a result of overstocking. By 2030, the stands are so densely stocked that the net annual growth of hardwood and softwood growing stock will be 22 percent and 14 percent below the levels attained in 1976, respectively.

Increased stand density also affects the trends in net annual sawtimber growth. However, it influences the growth on small diameter understory trees before it does that on larger diameter trees. As a result, net annual sawtimber growth peaks later than growing stock and in the case of softwoods continues to rise through 2030.

Projected trends in net annual growth by region and ownership in the North are very much the same as those in the section.

Net annual growth of growing stock expressed as a percentage of inventory also shows the effects of increasing stand density but more dramatically. Between 1976 and 2030, for example, that for growing stock drops from 3.3 percent to 1.7 percent, a decrease of about half. Because of the greater inventory accumulation that is projected on public lands, however, and the resulting impact upon stand density and net annual growth, the growth percentages on public lands decline more than they do on private lands. This is particularly evident on the National Forests in the Northeast.

Trends in Mortality. Mortality on hardwood growing stock in the North roughly doubled between 1952 and 1976, rising from about a half billion cubic feet to 0.9 billion. Mortality on hardwood sawtimber and on softwoods also rose in this period.

The historical rise in mortality which took place in both regions in the North, largely reflects the effects of tree suppression associated with the increasing inventories and stand densities. The projected increases in stand density result in additional mortality. Hardwood growing stock mortality moves up to 1.3 billion cubic feet in 2030, one and half times that of 1976. Softwood growing stock mortality increases 1.7 times to 0.6 billion cubic feet.

Trends in Inventories. As a result of the upward trend in net annual growth and relatively low removals, timber inventories rose fairly rapidly in the North between 1952 and 1977. The hardwood growing stock inventory, for example, went up from 84 to 129 billion cubic feet while that of softwoods rose from 28 to 45 billion. Growing stock inventories continue to rise in the North, reaching levels of 197 billion and 80 billion cubic feet, respectively, by 2030. Most of the growth in inventories is on the farmer and other private ownerships, a reflection of the concentration of commercial timberland area in these ownerships.

Trends in sawtimber inventories are about the same as those for growing stock. Trends by region and ownership are also similar.

Although the projected additions to inventories in the North are large, the rates of increase are below those of the 1952-77 period. In the case of growing stock, the projected rate (1.1 percent per year) is only about half the historical rate. This rapid fall off reflects the effects of rising stand densities on the smaller understory trees. The decline in the rate of growth in the sawtimber inventory is much less, from 1.8 percent between 1952 and 1977 to 1.4 percent for the projections.

Basal areas, a measure of stand density, move up with the increasing inventories. The rise is especially rapid on the National Forests where growing stock basal area reaches over 180 square feet per acre in 2030. That is quite high, considering that the average includes all stand sizes and that the rough and rotten basal area must be added to this estimate to achieve an estimate of total stand basal area.

These very high basal areas on the National Forests result in part from limited markets but they are also related to a National Forest management

Table 7.14—*Roundwood supplies, net annual growth, and growing stock inventory in the North, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	27	31	37	34	48	58	67	74	76
Net annual growth	75	95	98	122	152	166	172	173	172
Inventory	1,953	2,701	3,032	3,198	4,442	5,565	6,686	7,772	8,804
Hardwoods									
Roundwood supplies	41	43	55	64	77	87	94	101	105
Net annual growth	193	243	261	296	309	281	241	206	181
Inventory	4,780	6,518	7,471	8,650	11,676	14,008	15,887	17,356	18,397
Other public									
Softwoods									
Roundwood supplies	41	40	45	54	146	176	187	192	195
Net annual growth	122	155	167	190	200	194	189	187	185
Inventory	3,125	4,074	4,620	5,170	6,619	6,982	7,120	7,176	7,182
Hardwoods									
Roundwood supplies	68	77	97	95	119	139	158	177	195
Net annual growth	365	463	500	557	500	384	308	271	253
Inventory	8,680	11,817	13,687	15,464	21,261	24,387	26,344	27,657	28,549
Forest industry									
Softwoods									
Roundwood supplies	129	109	153	196	220	238	254	268	281
Net annual growth	223	280	402	432	456	438	409	382	359
Inventory	6,172	7,751	11,288	12,612	15,941	18,233	20,115	21,563	22,651
Hardwoods									
Roundwood supplies	117	86	126	144	198	245	291	338	371
Net annual growth	234	264	320	352	371	352	334	321	319
Inventory	6,960	8,467	10,226	11,376	14,507	16,140	17,150	17,489	17,507
Farmer and other private									
Softwoods									
Roundwood supplies	399	321	314	352	407	449	486	516	542
Net annual growth	573	704	695	854	914	863	783	710	659
Inventory	16,379	19,806	20,721	23,594	29,994	34,289	37,505	39,600	41,039
Hardwoods									
Roundwood supplies	1,155	1,123	1,186	1,199	1,631	1,952	2,262	2,602	2,838
Net annual growth	2,200	2,538	2,845	2,987	3,125	2,946	2,739	2,588	2,529
Inventory	63,225	76,269	84,817	93,080	114,550	125,487	131,694	133,295	132,747
Total North									
Softwoods									
Roundwood supplies	596	501	549	636	820	921	993	1,050	1,094
Net annual growth	993	1,234	1,362	1,600	1,722	1,660	1,554	1,452	1,374
Inventory	27,629	34,332	39,661	44,574	56,996	65,069	71,425	76,111	79,676
Hardwoods									
Roundwood supplies	1,381	1,329	1,464	1,502	2,024	2,422	2,805	3,217	3,510
Net annual growth	2,992	3,507	3,926	4,192	4,305	3,963	3,623	3,386	3,282
Inventory	83,645	103,071	116,201	128,571	161,994	180,021	191,074	195,797	197,201

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

policy which leads to longer rotations than are common on other ownerships. Multiple-use constraints upon National Forest timber harvesting activities are also implied in the projected harvest path.

The projected trends in inventories described above, and all the other projections of the timber resource in the North, are not inevitable. Alternatives do exist and they may well be taken before the changes in the resource reach the projected levels. For example, more timber stand improvement activity might be applied to change the species distribution of stands. This could result in more high quality inventory volume which is in greater demand. Another possible response might be to develop new processing techniques or new uses such as electric power generation which can utilize even larger volumes of low quality hardwoods projected to occur in the North. Growth in demand for fuelwood or other uses much beyond the levels shown in the demand chapter (Chapter 3) of this study could greatly change the timber resource outlook in the North.

Table 7.15—*Sawtimber supplies, net annual growth, and sawtimber inventory in the North, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	90	92	136	150	155	188	223	259	284
Net annual growth	178	247	279	366	408	497	594	695	793
Inventory	3,841	5,214	6,547	8,050	10,941	13,855	17,349	21,511	26,375
Hardwoods									
Sawtimber supplies	106	138	193	299	186	216	244	273	299
Net annual growth	375	507	531	689	657	691	705	714	723
Inventory	8,416	10,784	12,934	16,351	22,065	27,132	32,145	37,108	41,772
Other public									
Softwoods									
Sawtimber supplies	110	111	131	173	431	508	528	535	539
Net annual growth	320	460	443	545	512	517	518	518	517
Inventory	6,978	8,596	10,025	11,942	14,991	15,434	15,525	15,585	15,622
Hardwoods									
Sawtimber supplies	150	192	288	323	285	348	418	495	575
Net annual growth	653	973	1,028	1,189	1,126	1,098	1,087	1,103	1,127
Inventory	15,161	19,675	23,516	27,267	38,285	46,228	53,341	59,988	66,189
Forest industry									
Softwoods									
Sawtimber supplies	398	300	557	658	495	547	606	670	739
Net annual growth	456	553	918	845	934	1,018	1,092	1,150	1,197
Inventory	12,457	15,083	20,425	22,734	28,530	33,375	38,496	43,608	48,736
Hardwoods									
Sawtimber supplies	276	258	450	612	552	686	819	960	1,063
Net annual growth	485	623	819	779	915	942	959	965	971
Inventory	15,142	17,278	21,452	24,167	30,801	34,471	37,150	38,483	39,080
Farmer and other private									
Softwoods									
Sawtimber supplies	1,246	927	1,208	1,189	1,139	1,283	1,436	1,590	1,747
Net annual growth	1,382	1,660	1,857	2,319	2,383	2,548	2,641	2,677	2,690
Inventory	35,480	40,985	45,879	53,776	68,063	79,748	91,276	101,890	111,915
Hardwoods									
Sawtimber supplies	3,558	3,825	4,930	4,953	4,457	5,300	6,121	7,080	7,737
Net annual growth	5,312	6,252	7,038	7,152	7,237	7,319	7,301	7,256	7,260
Inventory	151,153	164,540	178,882	194,732	234,954	255,415	269,310	275,391	277,643
Total North									
Softwoods									
Sawtimber supplies	1,846	1,430	2,033	2,169	2,220	2,525	2,793	3,055	3,309
Net annual growth	2,337	2,920	3,498	4,077	4,237	4,579	4,845	5,041	5,197
Inventory	58,756	69,876	82,877	96,501	122,525	142,413	162,646	182,593	202,649
Hardwoods									
Sawtimber supplies	4,090	4,413	5,861	6,188	5,480	6,549	7,603	8,807	9,674
Net annual growth	6,825	8,355	9,417	9,809	9,936	10,050	10,052	10,039	10,081
Inventory	189,872	212,277	236,784	262,517	326,105	363,247	391,946	410,969	424,684

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Projected Changes in Timber Resources in the South

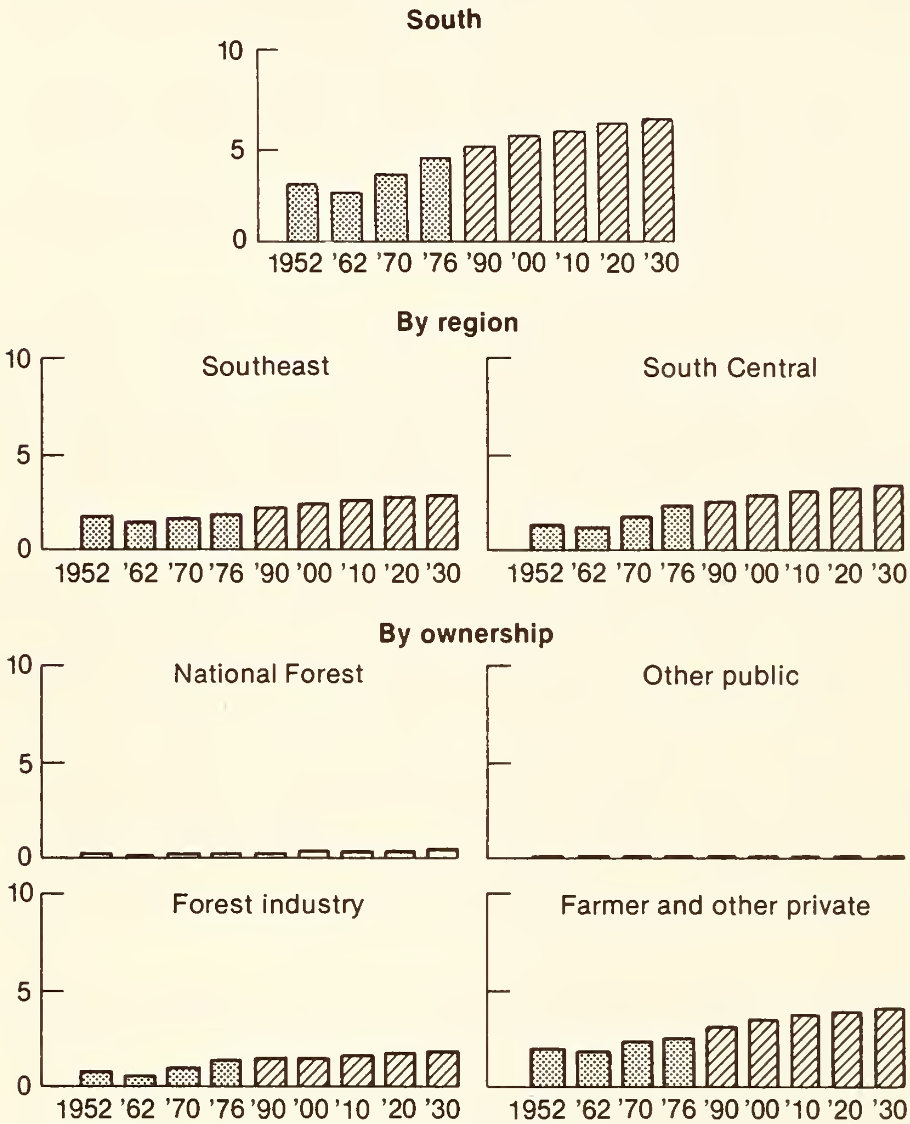
About two-fifths of the country's commercial timberland—some 188 million acres—is in the South. This land and its timber resources provide nearly half of the wood used in the pulp industry, almost a third of that used in the lumber industry, and about two-fifths of that consumed in the veneer and plywood industry. A large part of the posts, pole, piling, and other miscellaneous products produced also come from southern forests. The importance of the South as a source of timber has been growing. Further, it appears that most of the expansion in the timber products industries in the country in the next few decades is likely to be based on the timber resources of this section.

Trends in Commercial Timberland Area. The area of commercial timberland in the South rose from 192.1 million acres in 1952 to 199.9 million acres in 1962, but subsequently declined to 188.0 million acres in 1977 (table 7.16). There has been some decline in area in both the Southeast and South Central regions since 1962, although the drop was somewhat greater in the South Central region. Much of the loss in area was the

Figure 7.7

Softwood Roundwood Harvests in the South, 1952-76, with Projections of Supplies to 2030

Billion cubic feet



result of clearing for crop and pasture land, but there were also significant losses resulting from road construction and water impoundments.

The area of commercial timberland is projected to decline still further to 172.9 million acres by 2030. The projected drop is somewhat greater in the South Central region than in the Southeast, largely because of continued clearing for cropland in the lower Mississippi River Valley and for pastureland in upland areas.

Farmer and other private ownerships in 1977 contained 134.1 million acres of commercial timberland, 71 percent of the total in the South. Almost all of the projected decline in area in the South comes from these ownerships. However, these ownerships will still contain 67 percent of the total commercial timberland in the South in 2030.

The commercial timberland in forest industry ownership in 1977 was 36.2 million acres. This is projected to increase to 39.7 million acres by 2030, almost exclusively through the purchase of land from farmer and other private owners. In addition, forest industries will probably continue to expand the areas leased from these owners.

The area of National Forest and other public commercial timberland in the South is small and accounts for only 17.8 million acres, or 9 percent of the total. Little change is projected for 2030. Withdrawals of public timberland for wilderness or other restricted use categories are more limited in the South than in other sections of the country.

Trends in Timber Supplies. Total timber harvests have been rising rapidly in the South since 1962 (tables 7.17 and 7.18). Softwoods have accounted for almost all of the increase. Harvests of softwoods, nearly all pine, in 1976 totaled 4.2 billion cubic feet of roundwood (fig. 7.7) and 18.0 billion board feet of sawtimber products. These volumes were, respectively, 56 percent and 75 percent above those of 1962. The rise in harvests reflects the big expansion that has taken place in the pulp and softwood plywood industries in the South. There was also a substantial rise in softwood lumber production.

In 1976, about three-fifths of the total softwood timber harvests in the South came from the South Central region and two-fifths from the Southeast. However, most of the growth in harvests between 1962 and 1976 was in the South Central region where the output of both roundwood and sawtimber products doubled (Append. 4, tables 4.9-4.16). Harvests in the Southeast grew at a much slower rate—23 percent in the case of roundwood. These differential rates reflect the expansion of the timber using industries. Softwood net annual growth and inventories in the two regions were roughly the same.

About three-fifths of the softwood harvests in 1976 came from the farmer and other private ownerships. Another third came from forest industry. Harvests from the National Forests accounted for most of the remainder.

There have been significant differences in harvest trends among ownerships (tables 7.19 and 7.20). The biggest increase in volume terms was on forest industry ownerships. There was also a large rise in volume on the farmer and other private ownerships.

Projected softwood roundwood supplies rise to 6.2 billion cubic feet in 2030, an increase of 47 percent. Sawtimber product supplies are up by about the same percentage to 27.3 billion feet. In contrast to the 1962-76 period, more than half of the growth in volume terms takes place in the Southeast.

Table 7.16—*Area of commercial timberland in the South, by region and ownership, 1952, 1962, 1970, and 1977, with base level projections to 2030*

(Million acres)

Item	1952	1962	1970	1977	Projections 1990	2000	2010	2020	2030
Southeast									
National Forest	4.5	4.6	4.6	4.8	4.6	4.6	4.6	4.6	4.6
Other public	3.5	3.7	3.6	3.6	3.7	3.7	3.7	3.6	3.6
Forest industry	13.9	14.8	16.1	15.4	15.6	15.8	15.9	15.9	15.9
Farmer and other private	67.1	67.9	65.4	63.9	62.2	60.8	59.5	58.2	57.0
Total	89.1	91.0	89.8	87.8	86.1	84.8	83.6	82.4	81.1
South Central									
National Forest	5.9	6.1	6.1	6.1	6.0	6.0	6.0	6.0	6.0
Other public	2.9	2.7	3.1	3.2	3.4	3.4	3.5	3.6	3.6
Forest industry	18.1	18.7	18.9	20.8	22.2	23.1	23.4	23.7	23.8
Farmer and other private	76.1	81.4	74.5	70.1	64.9	62.4	60.7	59.5	58.3
Total	103.0	108.9	102.7	100.2	96.4	94.9	93.5	92.8	91.8
Total South									
National Forest	10.4	10.7	10.8	11.0	10.6	10.6	10.6	10.6	10.6
Other public	6.4	6.5	6.7	6.8	7.0	7.1	7.2	7.2	7.3
Forest industry	32.1	33.5	35.1	36.2	37.9	38.9	39.3	39.6	39.7
Farmer and other private	143.2	149.3	140.0	134.1	127.1	123.2	120.1	117.8	115.3
Total	192.1	199.9	192.5	188.0	182.5	179.7	177.2	175.1	172.9

Note: Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, and the projection years are as of January 1.

Projected softwood timber supplies in 2030 on all ownerships in the South are above those of 1976. The largest part of the projected increase for both roundwood and sawtimber products is on the farmer and other private ownerships. Most of the rest of the projected growth in supplies is on forest industry ownerships. The additional volumes expected from the National Forests and other public ownerships are relatively small.

The large increase in timber supplies on the private ownerships, and especially the farmer and other private, reflects in part responsiveness to the assumed increases in stumpage prices. It also reflects in part the relatively high stumpage prices and the associated acceptance of timber production as a management goal by many owners. Projected supplies on the National Forests are constrained by the harvest ceilings under the even-flow harvest policy.

In 1976, hardwood harvests in the South amounted to 1.7 billion cubic feet of roundwood and 6.3 billion board feet of sawtimber products. There was not much change in the volume of hardwood harvests between 1962 and 1976 in total or by region or ownership. This reflected the market situation. The hardwood resource in nearly all parts of the South could have sustained higher levels of harvest.

Hardwood supplies are projected to rise very rapidly to 5.2 billion cubic feet of roundwood and 17.4 billion board feet of sawtimber products by 2030. The volumes are, respectively, 3.1 and 2.7 times those of 1976. Most of the growth in supplies takes place in the early decades of the projection period; the rate of increase in the latter part of the period is much slower.

There is rapid expansion in hardwood supplies in both regions in the South, although the rise in the South Central region is somewhat larger than in the Southeast (Append. 4, tables 4.9-4.16). The increase occurs on all ownerships. In volume terms, however, by far the largest part of the rise in supplies is on the farmer and other private ownerships. Most of the remaining increase in supplies is on forest industry ownerships. The hardwood resource on the National Forest and other public ownerships in the South is relatively small—projected roundwood supplies from these ownerships account for about 5 percent of the total of all ownerships.

The projected increases in hardwood timber supplies are substantially larger than for softwoods. Nonetheless, softwood roundwood supplies in 2030 (6.2 billion cubic feet) are 1.2 times those of hardwoods.

Since 1952, the great bulk of the timber harvest in the South, over 90 percent in the case of softwoods, has come from growing stock. However, in 1976, about 0.2 billion cubic feet of softwood roundwood and the same volume of hardwood was cut from nongrowing stock sources such as tree tops and limbs; dead, rough, and rotten trees; fence rows and urban areas. These volumes are projected to increase, and especially for hardwoods, which quadruple by 2030. This largely reflects expanding demands for pulpwood and fuelwood and the associated growth in use of wood from all sources.

The outlook for supplies of sawtimber products by source is much the same as that for roundwood.

On the basis of the projected increases in timber supplies described above, it is apparent that the timber resources in the South during the next few decades can support a large expansion of the primary timber processing industries. Most of the growth is likely to be in the wood pulp and plywood industries although there may be further growth in the lumber industry, and particularly in the hardwood part. Expansion of the timber industries will, of course, add to employment and income in the forested rural areas of the South where other opportunities may be limited.

Trends in Timber Removals. Softwood removals from growing stock in 1976 were 4.5 billion cubic feet, including 18.9 billion board feet of sawtimber (tables 7.17 and 7.18). These volumes are, respectively, 59 and 74 percent above those of 1962. In the decade 1952-61, there was a small decline in removals.

Table 7.17—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the South, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock									
Roundwood products	2,792	2,472	3,371	4,021	4,618	5,096	5,457	5,689	5,855
Logging residues	196	167	248	252	223	207	192	182	181
Other removals[1]	124	173	149	198	383	323	286	256	266
Total	3,112	2,812	3,768	4,471	5,224	5,626	5,935	6,127	6,303
Net annual growth	3,625	4,680	5,605	6,158	6,720	6,800	6,732	6,625	6,488
Mortality	332	397	425	512	624	687	722	738	742
Roundwood supplies[2]									
From growing stock	2,792	2,472	3,371	4,021	4,618	5,096	5,457	5,689	5,855
From other sources[3]	257	237	160	213	269	297	318	363	374
Total	3,049	2,709	3,531	4,234	4,887	5,392	5,774	6,053	6,229
Inventory of growing stock[4]	58,246	71,554	84,896	97,137	119,833	134,699	145,385	152,465	156,120
HARDWOODS									
Removals from growing stock									
Roundwood products	1,568	1,337	1,579	1,490	2,350	2,964	3,500	4,033	4,379
Logging residues	547	431	462	296	447	502	523	524	487
Other removals[1]	448	945	692	315	499	425	379	344	345
Total	2,563	2,713	2,733	2,101	3,296	3,891	4,401	4,901	5,211
Net annual growth	2,823	3,133	3,971	4,547	4,724	4,563	4,362	4,226	4,120
Mortality	621	749	552	609	759	831	849	835	785
Roundwood supplies[2]									
From growing stock	1,568	1,337	1,579	1,490	2,350	2,964	3,500	4,033	4,379
From other sources[3]	367	311	254	202	382	502	617	740	834
Total	1,935	1,648	1,833	1,692	2,732	3,466	4,117	4,773	5,213
Inventory of growing stock[4]	78,238	84,486	91,923	104,873	130,525	142,820	146,839	144,123	135,550

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

The rising trend since 1962 is projected to continue. Softwood growing stock removals in 2030 are 6.3 billion cubic feet, 41 percent above 1976. Sawtimber removals show a roughly similar percentage rise to 27.4 billion board feet.

The harvest of roundwood products accounts for 90 percent or more of softwood removals during both the historical and projection periods. Thus the trends in softwood removals by region and by ownerships are much the same as those described above for timber supplies.

There has not been much change in the volume of softwood logging residues since 1952—they have been in the neighborhood of 0.2 billion cubic feet a year—and no great change is expected in the future. Logging residues as a percent of removals decline, in response to expected improvements in utilization resulting from rising stumpage prices.

In contrast to logging residues, there has been some increase in the volume of other removals of softwood as a result of clearing of commercial timberland. Some further increase is projected to 1990, followed by a slow decline to 2020. These changes reflect the assumptions on losses of commercial timberland.

Hardwood removals in 1976 were 2.1 billion cubic feet of growing stock and 7.7 billion board feet of sawtimber, levels substantially below those of 1970 and earlier years. Hardwood removals more than double by 2030 in response to growth in products removals. As was the case with softwoods, products account for most of the timber removals,

Hardwood forests in the South, as in the North, can sustain much higher levels of cutting.

Table 7.18—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the South, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber									
Roundwood products	10,884	9,856	13,728	17,628	18,337	20,664	22,744	24,378	25,688
Logging residues	543	410	561	661	589	559	534	520	530
Other removals[1]	454	625	605	649	1,530	1,300	1,182	1,084	1,160
Total	11,881	10,891	14,894	18,938	20,456	22,523	24,459	25,981	27,377
Net annual growth	13,638	17,981	21,136	24,167	26,999	28,821	29,826	30,223	30,076
Mortality	883	1,023	1,069	1,312	1,697	1,975	2,215	2,412	2,553
Roundwood supplies[2]									
From sawtimber	10,884	9,856	13,728	17,628	18,337	20,664	22,744	24,378	25,688
From other sources[3]	457	420	496	357	1,067	1,203	1,324	1,556	1,640
Total	11,342	10,275	14,225	17,985	19,404	21,867	24,068	25,934	27,327
Inventory of sawtimber[4]	196,556	245,712	295,804	341,022	427,160	495,310	555,193	604,146	638,275
HARDWOODS									
Removals from sawtimber									
Roundwood products	7,288	5,896	5,710	6,031	7,567	9,784	11,733	13,592	14,601
Logging residues	433	576	728	755	961	1,105	1,169	1,178	1,081
Other removals[1]	548	1,070	1,765	912	1,595	1,384	1,251	1,141	1,137
Total	8,269	7,542	8,204	7,698	10,124	12,273	14,154	15,911	16,820
Net annual growth	7,754	8,374	10,785	13,296	15,292	15,591	15,269	14,669	13,732
Mortality	1,743	2,100	1,448	1,615	2,034	2,319	2,453	2,439	2,297
Roundwood supplies[2]									
From sawtimber	7,288	5,896	5,710	6,031	7,567	9,784	11,733	13,592	14,601
From other sources[3]	404	406	514	305	1,231	1,658	2,070	2,493	2,781
Total	7,692	6,301	6,224	6,336	8,798	11,442	13,804	16,084	17,381
Inventory of sawtimber[4]	212,634	219,381	238,791	273,686	352,397	397,063	418,028	415,744	390,687

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

and past and future trends in timber removals by region and ownership are generally similar to those described for timber supplies.

The drop in timber removals in the 1970's was mostly due to a decrease in the volume of logging residues and other removals. These declines resulted from improvements in utilization, and in the case of other removals, by a slowdown in the clearing of commercial timberland for other uses. The projections show some increase in the volume of logging residues and other removals and then a gradual decline. This pattern is based upon the assumptions on improvements in utilization and the projected changes in commercial timberland area.

Removals expressed as a percentage of growing stock inventory were 4.6 percent for softwoods and 2.0 percent for hardwoods in 1976. The removal rate for softwoods falls to 4.0 percent by 2030 while that for hardwoods increases to 3.8 percent. The increases in hardwood removal percentages are largest on the farmer and other private and forest industry ownerships. This is related to a greater degree of responsiveness of timber harvests to the projected price and inventory changes on private ownerships.

In 1976, the growing stock removal percentage was higher in the South Central region (3.5 percent) than in the Southeast (3.0 percent). By 2030, the removal percentages in both regions increase, to 4.7 percent and 3.3 percent respectively. The larger increase in the South Central region is also linked back to the responsiveness of harvests to price and inventory changes on the farmer and other private ownerships.

Trends in Net Annual Growth. Net annual growth of softwood growing stock rose in the South from 3.6 billion cubic feet in 1952 to 6.2 billion in 1976. It is projected to continue to increase to a peak in 2000 of 6.8 billion cubic feet, 10 percent above 1976. It declines slightly thereafter to 6.5 billion cubic feet in 2030.

Softwood sawtimber net annual growth follows the trends set by growing stock although it is projected to peak later around 2020 at 30.2 billion board feet, a level 25 percent higher than in 1976. It declines thereafter just like the growing stock net growth.

In general, the trends in net annual softwood growth in the regions in the South are similar although the trend declines earlier and further in the Southeast than in the South Central region. The trends by the major owner-

Table 7.19—*Roundwood supplies, net annual growth, and growing stock inventory in the South, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	155	117	180	235	222	261	303	346	380
Net annual growth	287	421	432	374	386	381	368	356	348
Inventory	4,974	6,865	7,234	8,225	10,253	11,736	12,733	13,203	13,201
Hardwoods									
Roundwood supplies	50	40	49	33	50	69	88	108	126
Net annual growth	129	183	224	257	242	203	170	155	149
Inventory	3,950	5,226	5,844	7,023	9,466	11,133	12,232	12,901	13,297
Other public									
Softwoods									
Roundwood supplies	93	74	106	122	120	122	125	127	127
Net annual growth	124	139	196	206	248	259	252	234	214
Inventory	2,223	2,622	3,222	3,738	5,248	6,622	7,995	9,237	10,282
Hardwoods									
Roundwood supplies	47	32	49	68	93	112	128	142	152
Net annual growth	76	95	133	157	172	170	159	148	136
Inventory	1,950	2,498	3,139	3,738	4,968	5,700	6,190	6,451	6,511
Forest industry									
Softwoods									
Roundwood supplies	802	580	960	1,366	1,452	1,534	1,612	1,686	1,754
Net annual growth	1,082	1,382	1,430	1,501	1,666	1,764	1,820	1,862	1,889
Inventory	16,391	20,709	21,554	23,359	26,564	29,549	32,213	34,629	36,654
Hardwoods									
Roundwood supplies	284	323	321	291	521	673	801	940	1,037
Net annual growth	367	452	589	689	770	797	799	807	806
Inventory	10,768	13,118	14,207	16,434	20,949	23,228	23,885	23,619	22,177
Farmer and other private									
Softwoods									
Roundwood supplies	1,998	1,937	2,286	2,511	3,092	3,475	3,735	3,894	3,968
Net annual growth	2,132	2,738	3,549	4,078	4,420	4,396	4,292	4,172	4,037
Inventory	34,658	41,358	52,886	61,814	77,769	86,792	92,444	95,396	95,983
Hardwoods									
Roundwood supplies	1,554	1,252	1,414	1,299	2,068	2,613	3,099	3,583	3,897
Net annual growth	2,251	2,403	3,025	3,443	3,540	3,394	3,233	3,117	3,029
Inventory	61,569	63,644	68,734	77,680	95,142	102,759	104,531	101,152	93,567
Total South									
Softwoods									
Roundwood supplies	3,049	2,709	3,531	4,234	4,887	5,392	5,774	6,053	6,229
Net annual growth	3,625	4,680	5,605	6,158	6,720	6,800	6,732	6,625	6,488
Inventory	58,246	71,554	84,896	97,137	119,833	134,699	145,385	152,465	156,120
Hardwoods									
Roundwood supplies	1,935	1,648	1,833	1,692	2,732	3,466	4,117	4,773	5,213
Net annual growth	2,823	3,133	3,971	4,547	4,724	4,563	4,362	4,226	4,120
Inventory	78,238	84,486	91,923	104,873	130,525	142,820	146,839	144,123	135,550

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

ships are also about the same. However, net annual growth on the forest industry ownerships in the South Central region continues to ries through the projection period.

Overstocking is a major cause of the peaking and subsequent decline of net annual softwood growth. The failure to maintain an adequate flow of small diameter softwood trees into the inventory is another contributing factor. The larger diameter softwood trees are being harvested at a faster rate than they are replaced by trees growing up from the small diameter classes.

This reflects the failure to regenerate the stands back to pine after they are harvested.[10] A recent study in Georgia showed, for example, that 54 percent of the loblolly pine acreage harvested between 1961 and 1972 was not regenerated back to loblolly pine.[11] Similarly, 26 percent of the loblolly pine stands that received a timber stand improvement treatment shifted forest types because of the increased dominance of hardwoods. This does not mean that timber stand improvement practices

[10] Knight, Herbert A. The Southern pines need your help. (Manuscript in process.) U.S. Dep. Agric., Forest Service, Washington, D.C. 9 p. 1978.

[11] Boyce, Stephen G. and Joe P. McClure. How to keep one-third of Georgia in pine. U.S. Dep. Agric., Forest Service, Washington, D.C. Res. Pap. SE-144, 23 p. 1975.

Table 7.20—*Sawtimber supplies, net annual growth, and sawtimber inventory in the South, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	766	539	903	1,214	1,039	1,256	1,494	1,736	1,933
Net annual growth	1,251	1,834	1,997	1,712	1,866	1,942	1,954	1,931	1,886
Inventory	18,590	27,063	28,924	33,980	43,642	51,483	57,583	61,322	62,614
Hardwoods									
Sawtimber supplies	218	175	201	160	166	239	321	406	492
Net annual growth	325	475	600	735	849	828	787	772	778
Inventory	10,396	13,841	15,401	18,561	26,506	32,962	38,300	42,555	45,997
Other public									
Softwoods									
Sawtimber supplies	338	286	410	499	515	543	577	610	634
Net annual growth	443	522	755	894	1,082	1,232	1,304	1,298	1,243
Inventory	7,858	9,021	11,397	13,884	20,105	26,580	33,901	41,315	48,185
Hardwoods									
Sawtimber supplies	184	110	168	240	332	415	492	563	624
Net annual growth	206	273	391	498	644	687	702	695	663
Inventory	5,411	7,121	8,924	10,887	15,205	18,265	20,845	22,859	24,166
Forest industry									
Softwoods									
Sawtimber supplies	3,414	2,455	4,223	6,347	5,936	6,273	6,651	7,063	7,478
Net annual growth	4,632	5,575	5,837	6,032	6,602	7,148	7,620	8,040	8,352
Inventory	64,471	76,779	82,102	86,390	96,186	106,766	117,778	129,581	140,860
Hardwoods									
Sawtimber supplies	1,113	1,187	1,060	1,051	1,760	2,329	2,793	3,247	3,485
Net annual growth	991	1,151	1,660	2,014	2,632	2,786	2,773	2,698	2,531
Inventory	30,230	33,941	39,439	45,491	60,012	67,905	70,334	68,815	62,587
Farmer and other private									
Softwoods									
Sawtimber supplies	6,824	6,994	8,689	9,925	11,914	13,794	15,346	16,524	17,282
Net annual growth	7,312	10,049	12,546	15,528	17,450	18,500	18,949	18,954	18,594
Inventory	105,636	132,850	173,382	206,769	267,227	310,482	345,931	371,928	386,616
Hardwoods									
Sawtimber supplies	6,178	4,830	4,795	4,886	6,540	8,459	10,198	11,868	12,781
Net annual growth	6,232	6,477	8,135	10,048	11,167	11,291	11,008	10,505	9,760
Inventory	166,597	164,478	175,027	198,746	250,674	277,931	288,549	281,515	257,938
Total South									
Softwoods									
Sawtimber supplies	11,342	10,275	14,225	17,985	19,404	21,867	24,068	25,934	27,327
Net annual growth	13,638	17,981	21,136	24,167	26,999	28,821	29,826	30,223	30,076
Inventory	196,556	245,712	295,804	341,022	427,160	495,310	555,193	604,146	638,275
Hardwoods									
Sawtimber supplies	7,692	6,301	6,224	6,336	8,798	11,442	13,804	16,084	17,381
Net annual growth	7,754	8,374	10,785	13,296	15,292	15,591	15,269	14,669	13,732
Inventory	212,634	219,381	238,791	273,686	352,397	397,063	418,028	415,744	390,687

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

should not be applied, but rather that they must be applied properly and must not take on the characteristics of a high-grading harvest.

In total, in the South between 1970 and 1976, the area in pine types declined by over 4 million acres. There were increases in some hardwood types —that of oak-hickory by nearly 3 million acres.

The acreage capable of growing pines but not currently occupied by pine stands provides an indication of how far this movement toward hardwood types has progressed. In 1974, there was an estimated 138 million acres of pine site land in the South.[12] Sixty-five million acres, or slightly less than half, was occupied by pine trees. The other half was roughly split between acres in oak-pine, an intermediate step in the succession to hardwoods, and hardwood trees. Even more significant is the fact that on the Coastal Plain—where all of the major species of southern pine attain optimum development—only 56 percent of the pine sites is occupied by pines, the remainder is in hardwoods.[13]

[12] Murphy, Paul A. and Herbert A. Knight. Hardwood resources on pine sites. Forest Prod. J. 24(7):13-16. 1974.

[13] Sternitzke, Herbert S. Coastal Plain hardwood problem. J. Forestry 76(3):152-153. 1978.

Much of today's pine land in the South is the result of natural seeding of abandoned cropland. Many of these sites are progressing toward their climax hardwood types after they are harvested because no active management action is being taken to regenerate them to pine. Active management is especially necessary today in the absence of repeated wildfires which tended to hold back the progression to hardwoods. Prescribed burning can accomplish the same end but it has become controversial as a nonpoint source of pollution. Site preparation, with either artificial or natural regeneration, is currently applied to a relatively small percentage of the acres of pine harvested each year. The eventual rundown of net growth and excess of removals over net growth on private lands in the base level projection is the result.

The projections of net annual softwood growth in the South were developed from the most recent survey data. However, for some States, the surveys are several years old. Data from the newest surveys in other States suggest that the shift from pine to hardwoods has been accelerating, with most of the change taking place in the last few years. If this is occuring in the States for which recent surveys are not available, the decline in net annual growth will be larger than that shown by the projections. On the other hand, the older data may not adequately reflect recent upward trends in the planting of pine on forest industry ownerships. If this is the case, net annual growth on these ownerships would be above the levels shown in the last decades of the projection period.

Although the trends in net annual softwood growth in the South may be different than projected, this is not likely to have a significant effect on projected supplies until after 2030. As indicated in the introductory part of this chapter and in Appendix 4, inventories are one of the direct determinants of projected supplies. Thus changes in net annual growth do not significantly affect projected timber supplies until there are substantial impacts on inventories.

Net annual growth of hardwoods follows in a general way the trends for softwoods. For example, the net annual growth of hardwood growing stock rose from 2.8 billion cubic feet in 1952 to 4.1 billion in 1976. It is projected to continue to rise to a peak of 4.7 billion cubic feet in 1990 and then fall off to 4.1 billion in 2030. Hardwood sawtimber net annual growth reaches a high of 15.6 billion board feet in 2000, and, despite some decline, is still somewhat above the 1976 level in 2030.

The projected decline in net annual growth of hardwoods reflects overstocking. Inventories accumulate to the point where radial growth slows and mortality increases.

Net annual growth as a percentage of growing stock inventory—6.3 percent for softwoods and 4.3 percent for hardwoods in 1976—was quite high in the South in comparison to the levels in other sections. These percentages drop through the projection period as stand density increases and net annual growth declines. However, they are still high in 2030—4.2 percent for softwoods and 3.0 percent for hardwoods.

Growth percentages were highest in 1976 on the forest industry and farmer and other private ownerships, and this continues through 2030. Most growth rates on the public lands in 2030 are less than half those of 1976.

Trends in Mortality. Between 1952 and 1976, softwood timber mortality in the South tended upward from 0.3 billion to 0.5 billion cubic feet. Hardwood mortality showed no trend, fluctuating around 0.6 billion cubic feet a year. With respect to the future, projetced mortality of both softwoods and hardwoods rises slowly to 0.7 billion and 0.8 billion cubic feet respectively. Mortality is up in both regions in the South, reflecting the increasing stand densities. Hardwood mortality does drop in the southern regions after removals rise above net growth toward the end of the projection period.

Trends in Inventories. During the years 1952-77, the inventory of softwood growing stock in the South rose by 67 percent, from 58 to 97 billion cubic feet. Softwood sawtimber inventories increased by 73 percent to 341 billion board feet. Hardwood inventories also increased substantially although the increases were smaller than for softwoods, and especially so for sawtimber.

Softwood growing stock inventories are projected to continue to increase through the projection period, reaching 156 billion cubic feet in 2030. However, the rate of increase progressively slows as removals approach net annual growth. Softwood sawtimber inventories show a similar trend, rising to 638 billion board feet in 2030. In some contrast, hardwood timber inventories, both for growing stock and sawtimber, peak in 2010 and then drop fairly rapidly through the remaining decades of the projection period.

Pines occupy a little less than half of the pine site lands in the South. Further, large acreages of pine are reverting to hardwoods after harvest. Unless action is taken to reverse this trend, the projected increases in softwood timber supplies in the South will be a temporary thing lasting only a few decades and followed by a sharp decline.

Inventory trends by region and by ownership are roughly similar to those of the section. The only significant exception is the hardwood trends on the public ownerships—these continue to increase. These ownerships account for a relatively small part of total inventories. As a result, most of the projected changes in inventory volumes are on the farmer and other private and forest industry ownerships.

In 1977, timber inventories in the southern regions were about the same with the exception of softwood sawtimber in the South Central region which contains a larger proportion of this kind of timber. By 2030, the distribution changes and inventories in the Southeast are somewhat larger than those in the South Central region for all types of timber.

The bulk of the timber inventories in 1977 in both regions was on the farmer and other private ownerships. Most of the remainder was on the forest industry ownerships. These ownerships continue to have the largest part of the inventories through 2030.

One of the most important conclusions to be drawn from the base-level projections discussed above is the likelihood of increased dependence on the softwood timber resources in the South, and the farmer and other private ownerships in particular, as a source of softwood timber supplies. There is, of course, a lot of uncertainty associated with the supply outlook from this source, and especially that in the last decades of the projection period and beyond.

Although past evidence indicates that farmer and other private owners in the South are quite responsive to changes in stumpage prices, they also have non-timber management objectives which may constrain future harvest levels just as these same goals influence harvests on public lands.

Even more important from the standpoint of longrun supplies is the general reluctance of farmer and other private ownerships to actively invest in timber-growing practices such as site preparation and planting or precommercial thinning. While this may be rational from the individual owner's point of view, it can affect future softwood supply in a major way. The primary reason for the softwood net growth decline on farmer and other private ownerships in the South is the failure to regenerate harvested pine stands back to pine. Most of the softwood inventory in the South today is the result of natural regeneration on abandoned crop or pasture land. Given the current level of fire protection and the significant reduction in the reversion of land to forests, this softwood resource can only be maintained or increased through more active investments in regeneration practices than are common today on these ownerships.

Projected Changes in Timber Resources in the Rocky Mountains

The Rocky Mountains contain 141 million acres of forest land. However, less than half of this—58 million acres or 12 percent of the national total—is commercial timberland. As a result, the section plays a relatively minor role in the production of timber, accounting for only 6 percent of the output of roundwood products from all sections in 1976. Over four-fifths of the timber products produced, some 642 million cubic feet, was used in the manufacture of lumber. Most of the remaining volume, 135 million cubic feet, was used in the production of plywood.

While the output of timber products is comparatively small, the forests of the Rocky Mountains are highly valued for other purposes. They provide a wide variety of dispersed outdoor recreation opportunities, habitat for large numbers of big game animals including elk and mule deer, and are among the most valuable watersheds in the Nation. They also include large areas of great natural beauty that are prized by millions of people.

Although the Rocky Mountains cover a large geographic area, no attempt has been made in this study to break the section into regions in projecting changes in the timber resource because of limitations on data. Further, practically all of the timber in the Rocky Mountains is softwoods. Thus the following discussion is largely in terms of totals—softwoods and hardwoods. It is recognized, however, that while the hardwood resource is small, it is locally important as a source of firewood, posts, and other miscellaneous products.

Trends in Commercial Timberland Area. Longrun historical trends in forest areas in the Rocky Mountains cannot be quantified. It is known that some forest land was cleared for crop and pasture land during early settlement and at a somewhat later date to provide timber for railroads, mines, and ore smelting. Most of the area cleared in harvesting timber for various products has probably regenerated to forests and this may explain the rise in area between 1952 and 1962 (table 7.21).

Between 1962 and 1977, the area classified as timberland fell from 64.4 to 57.8 million acres. Nearly all of this decline was on the public ownerships, chiefly on the National Forests. Most of the reduction resulted from the withdrawal of commercial timberland for wilderness.

In addition to the loss of area, the use of the commercial timberland in the National Forests for timber production is constrained in various ways because of potential adverse impacts of management or harvesting activities on non-timber values or uses. The need to protect fragile soil on steep slopes or the habitat of some species of wildlife are examples of such concerns. The extent of the constraints is shown in the tabulation below—the use of all of the land in the special, marginal, and unregulated classes is constrained for timber production in some significant way.

Component class[14]	*Percentage of National Forest commercial timberland by component class in 1977*
Standard	42
Special	15
Marginal	30
Unregulated	13

The recent downward trend in the area of commercial timberland in the Rocky Mountains is expected to continue to a level of 53.0 million acres in 2030, some 8 percent below that of 1977. The projected loss is almost entirely on the National Forests and farmer and other private ownerships. The reduction on the National Forests is largely due to expected shifts to wilderness. At this time, there is great uncertainty about the extent of such change because it will depend on Congressional action. The reduction is simply the best estimate of Forest Service personnel responsible for the management of the National Forests in the Rocky Mountain section. There may also be further shifts of commercial timberland in the National Forests to the special, marginal, and unregulated classes.

In total, in 1977, private owners held only 14.6 million acres or 25 percent of the commercial timberland and this drops slightly over the projection period. As a result, public management and harvesting policies have been and are likely to continue to be major determinants of timber supplies and other changes in the timber resource in the Rocky Mountain section.

Trends in Timber Supplies. Timber harvests in the Rocky Mountain section increased from 0.5 billion cubic feet of roundwood in 1952 to 0.8 billion in 1970, a rise of 63 percent (table 7.22). Sawtimber product harvests showed a similar trend, moving up from 3.1 to 4.9 billion board feet (table 7.24). Between 1970 and 1976, however, there was some drop in both roundwood and sawtimber product harvests because of reduced harvests from National Forest lands (tables 7.24 and 7.25). This was caused in part by the withdrawal of public funding for access roads after 1970 and by delays resulting from litigation and studies of the suitability of unroaded areas for wilderness. About 55 percent of the timber harvested in the section in 1976 came from the National Forests.

Roundwood supplies are projected to go up from 0.8 billion cubic feet in 1976 to 1.1 billion cubic feet in 2030. Sawtimber product supplies are also projected to increase, rising from 4.7 to 5.4 billion board feet. Most of the increase in projected supplies is on the National Forests. As a result, the National Forest share of roundwood supplies is projected to rise from 55 percent in 1976 to 67 percent in 2030. Roundwood supply from the other public ownerships is projected to drop slightly and then hold roughly constant through the projection period.

Although there is a substantial rise in supplies from the National Forests, the projections do not reach the harvest ceilings. This largely reflects the high extraction costs of the timber in unroaded and mountainous areas. Con-

[14]Definitions of each component class are given in footnote 9, page 168.

straints associated with the protection of the environment and multiple use also tend to hold down the projections.

The projected supplies of timber from private ownerships, both forest industry and farmer and other private, do increase although not as much as on the National Forests. This slower rate of growth reflects in part relatively low stumpage prices and the importance of non-timber objectives of the owners, and especially the farmer and other private owners. Much of the area in these latter ownership is of low productivity and the opportunity costs of using the land for non-timber purposes are small.

Only about 5 percent of the timber harvested in the Rocky Mountains, or 36 million cubic feet, comes from non-growing stock sources. This percentage is not expected to change and the vol-

In addition to timber production, the forests of the Rocky Mountains are highly valued as watersheds, for dispersed outdoor recreation, and as habitat for large numbers of big game animals.

Table 7.21—*Area of commercial timberland in the Rocky Mountains, by ownership, 1952, 1962, 1970, and 1977, with base level projections to 2030*

(Million acres)

Ownership	1952	1962	1970	1977	Projections 1990	2000	2010	2020	2030
National Forest	41.9	42.5	40.3	36.4	35.2	34.7	34.2	33.8	33.5
Other public	7.2	7.2	7.2	6.7	6.7	6.7	6.7	6.7	6.6
Forest industry	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1
Farmer and other private	12.5	12.5	12.4	12.5	12.1	11.8	11.4	11.1	10.7
Total	63.9	64.4	62.1	57.8	56.1	55.2	54.4	53.6	53.0

Note: Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, and the projection years are as of January 1.

Table 7.22—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the Rocky Mountains by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock									
Roundwood products	467	646	776	738	860	958	1,022	1,069	1,086
Logging residues	57	79	98	91	94	96	95	94	94
Other removals[1]	10	13	15	13	258	202	196	196	183
Total	534	738	889	842	1,212	1,256	1,313	1,359	1,363
Net annual growth	1,097	1,253	1,449	1,589	1,629	1,607	1,557	1,493	1,427
Mortality	568	602	545	459	500	525	549	564	573
Roundwood supplies[2]									
From growing stock	467	646	776	738	860	958	1,022	1,069	1,086
From other sources[3]	29	38	38	35	45	50	54	56	57
Total	496	684	814	773	906	1,008	1,076	1,125	1,143
Inventory of growing stock[4]	87,457	93,104	94,413	94,935	101,425	106,171	109,903	112,500	114,324
HARDWOODS									
Removals from growing stock									
Roundwood products	3	3	4	3	4	5	5	6	5
Logging residues	([5])	([5])	([5])	1	1	1	1	1	1
Other removals[1]	([5])	([5])	([5])	([5])	1	1	1	1	1
Total	3	3	4	4	6	7	7	7	7
Net annual growth	57	66	84	100	98	96	94	91	87
Mortality	35	39	46	39	42	45	47	49	49
Roundwood supplies[2]									
From growing stock	3	3	4	3	4	5	5	6	5
From other sources[3]	8	11	8	1	([5])	([5])	([5])	([5])	([5])
Total	11	14	12	4	5	5	5	6	5
Inventory of growing stock[4]	3,978	4,502	4,877	4,879	6,129	6,519	6,865	7,147	7,338

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.
[5]Less than 0.5 million cubic feet.

ume of timber roundwood and sawtimber products from non-growing stock sources remains relatively small, only 57 million cubic feet in 2030 in the case of roundwood.

Trends in Timber Removals. Timber removals have followed the trends in timber products harvests. Projections of removals also follow very similar trends to those described above for supplies.

The trends in logging residues and other removals are somewhat different. There was some increase in logging residues between 1952 and 1970 but the volume remains around 0.1 billion cubic feet through 2030. There was little change in other removals between 1952 and 1976 but a sharp rise takes place in the 1980's and 1990's to around 0.3 billion cubic feet. The jump in the volume of other removals reflects the assumptions on losses of commercial timberland. In the projection model, the timber inventories on the lands diverted to other uses are deducted from timber inventories as other removals.

Removals from growing stock as a percentage of timber inventories in the Rocky Mountains in 1976 were 0.8 percent, smaller than in any other region of the country except Alaska. The removal percentage is projected to rise to 1.1 percent in 2030, but it will still be one of the lowest in the country.

The projected 2030 sawtimber removal percentage (1.4 percent) is higher than the growing stock percentage, but is also low relative to other regions. In part, this reflects the relatively low productivity of timberlands in the Rocky Mountains and in part the importance assigned to non-timber objectives on public and farmer and other private ownerships. As timber is held beyond its financial maturity because of scenic values or other reasons, removal rates are necessarily reduced.

Trends in Net Annual Growth. Net annual growth of growing stock in the Rocky Mountains rose 46 percent between 1952 and 1976, moving up from 1.2 billion cubic feet to 1.7 billion cubic feet. That for sawtimber rose by 55 percent to 6.6 billion board feet. In terms of percentages, there were substantial increases in net annual growth on all ownerships. In volume terms, however, by far the largest part was on the National Forests.

The outlook for the future is quite different from that of the base period. Net annual growth of growing stock rises slightly to 1990 but then begins to drop and by 2030 is 10 percent below 1976. Sawtimber net annual growth increases slowly to 2030 but drops thereafter. With the exception of forest industry ownerships where net annual growth continues to increase, the trends by ownership approximately follow those for the section.

The projected decline in net annual growth, just as in several other regions, reflects the effects of overstocking. Protection from wildfires, lack of markets for small timber, and the inherent tolerance of many species in the Rocky Mountains to crowding result in large areas of essentially stagnated stands where net annual growth is low.

There are some areas where harvesting has been heavy enough so that overstocking is not a problem. A recent study indicates that this is the case in Northern Idaho and Western Montana.[15] These areas were originally stocked with stands of large high quality white pine, larch, and ponderosa pine.

Net annual growth as a percentage of growing stock inventory in the Rocky Mountains in 1976 was 1.7 percent, lower than anywhere in the East and about the same as in the Pacific Coast which also has large volumes of old-growth timber. Unlike the Pacific Coast and Alaska, however, where growth percentages are expected to increase in response to the liquidation of the old-growth, the growth percentage in the Rocky Mountains drops to 1.2 percent in 2030. This is a result of overstocking and the generally low productivity of the commercial timberlands in the section.

Trends in Mortality. Because of the large proportion of old-growth timber and major losses to insects such as bark beetles, diseases such as white pine blister rust, and wildfires, mortality in the Rocky Mountains has always been high. There was some decline between 1962 and 1976—sawtimber mortality dropped from 2.6 billion board feet to 1.9 billion—but it begins to rise again after 1990, reaching 2.2 billion board feet in 2030. The rising trend in mortality, as was the case for net annual growth, reflects the effects of overstocking.

Most of the timber mortality in the Rocky Mountains takes place in unroaded areas and is not salvable with conventional ground logging equipment. There is likely to be some improvement in salvage potential as the road system in the section is expanded, and this is shown by the projected increases in supplies from non-growing stock sources. But the lack of markets, low stumpage values, and scattered nature of much of the mortality will continue to limit the amount harvested.

Trends in Inventories. Growing stock inventories have been increasing, although very slowly, in the Rocky Mountains and in 1977 totaled about 100 million cubic feet. About 95 percent of this volume was softwoods.

In contrast to growing stock, the sawtimber inventories fell from about 399 billion board feet in 1962 to 390 billion in 1977. The drop in sawtimber inventories was concentrated on the forest industry ownerships and the National Forests. There was little change in the inventories on the other ownerships in this period.

The projections show rising trends in inventories on all ownerships except forest industry. Total inventories rise to 122 billion cubic feet of growing stock and 447 billion board feet of sawtimber —levels that are, respectively, 22 percent and 15 percent above 1977. Most of the increase in inventories is on the National Forests.

Projected Changes in Timber Resources in the Pacific Coast (excluding Alaska and Hawaii)

The forests of the Pacific Coast States of California, Oregon, and Washington were the source of half of the softwood sawtimber harvested in the country in 1976 and two-fifths of the softwood roundwood. This timber was used to manufacture a little over 50 percent of all the softwood lumber and softwood plywood produced in the country. In addition, it provided about a fifth of the wood used in the pulp industry and for poles, piling, fenceposts, and other miscellaneous products. The hardwood forests of the section also contributed to timber supplies although the volume was small in comparison to eastern harvests.

The harvests from the Pacific Coast come from a commercial timberland area of only 59 million acres—some 12 percent of the Nation's total. The high level of output from this relatively small area is mostly due to the large volumes of old-growth softwood timber—the section contains half of the softwood sawtimber inventory in the United States. Most of the timber that has been harvested to date has come from old-growth stands, which are still a major resource on public lands. On private lands, most of the old-growth timber is gone, and much of the timber harvesting in recent years has been from

[15] Hatch, Charles R. et al. Timber supply projections for the State of Idaho. Bull. 15. Forest, Wildlife and Range Experiment Station, State University of Idaho. 19 p. 1976.

As a result of the lack of markets for small timber, tolerance to crowding, and protection from wildfires, there are large areas of essentially stagnated stands in the Rocky Mountains.

The forests of the Pacific Coast States—California, Oregon, and Washington—are the source of about half of the softwood sawtimber harvested.

young-growth stands, mainly those on farmer and other private ownerships.

Public lands which contain a large part of the commercial timberland and timber inventories, are a major source of timber harvests in the Pacific Coast. As a result, public policies affect timber supplies in the Pacific Coast section to a very important degree.

Trends in Commercial Timberland Area. Between 1952 and 1962, there was not much change in the area of commercial timberland in the Pacific Coast, it remained close to 63 million acres (table 7.26). Between 1962 and 1977, however, the area declined by 5 percent to 59.4 million acres. About half the loss in area was in the Douglas-fir region and most of the remainder in the Pacific Southwest.

The reduction in area was concentrated on the farmer and other private ownerships—2.3 million acres, and the National Forest — 1.6 million acres. There was also a slight drop on the other public ownerships but an increase of 0.6 million acres on the forest industry ownerships.

The losses in commercial timberland in the Pacific Coast, as in other sections, resulted from a number of causes. Considerable acreage has been converted to crop and pasture land in the Douglas-fir region and in the Coastal areas of California. The construction of roads and clearing for utility lines and reservoirs have accounted for a significant part of the reduction. Part of the loss on the National Forests reflects shifts to wilderness use.

The recent trends in timberland area in the Pacific Coast are projected to continue and for the same reasons during the projection period. The projected area in 2030 is 53 million acres, 11 percent below that of 1977. The largest loss is in the Douglas-fir region although there is a drop of at least 10 percent in all regions. Further, most of the reduction is on the National Forests and on farmer and other private ownerships and takes place by 1990. The projected loss on the National Forests is in large part due to expected shifts to wilderness use. That on the farmer and other private ownerships reflects losses from clearing for crop and pastureland, urban uses, and other similar purposes and some further shifts to forest industry ownership. The shifts to forest industry ownerships are expected to offset losses on the forest industry holdings from road construction and diversions to other uses. As a result, the area of commercial timberland on these ownerships stays constant through 2030.

As in the Rocky Mountains, a substantial part of the commercial timberland on the National Forests in the Pacific Coast section is subject to constraints which affect the use of the land for timber production. An indication of the extent of these constraints is shown in the tabulation below.

The special and marginal components of the National Forest lands are

Component class[16]	*Percentage of National Forest commercial timberland in the Pacific Coast by component class, 1977*	
	Washington and Oregon	*California*
Standard	66	58
Special	17	12
Marginal	14	26
Unregulated	3	4

[16]Definitions of each component class are given in footnote 9, page 168.

Table 7.23—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the Rocky Mountains, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber									
Roundwood products	2,947	3,968	4,602	4,473	4,281	4,684	4,910	5,049	5,080
Logging residues	177	241	289	277	233	235	227	223	220
Other removals[1]	60	78	90	77	1,303	980	932	918	847
Total	3,184	4,287	4,981	4,827	5,818	5,899	6,069	6,189	6,147
Net annual growth	4,166	4,541	5,098	6,337	6,407	6,697	6,845	6,865	6,815
Mortality	2,476	2,526	2,366	1,847	1,838	1,907	1,993	2,039	2,097
Roundwood supplies[2]									
From sawtimber	2,947	3,968	4,602	4,473	4,281	4,684	4,910	5,049	5,080
From other sources[3]	186	228	326	175	226	245	257	265	267
Total	3,133	4,196	4,928	4,648	4,507	4,929	5,167	5,314	5,347
Inventory of sawtimber[4]	380,795	389,825	383,386	380,379	392,973	401,675	413,872	423,415	432,357
HARDWOODS									
Removals from sawtimber									
Roundwood products	14	18	10	13	14	18	19	22	22
Logging residues	1	1	1	1	1	1	1	1	1
Other removals[1]	1	1	1	1	4	4	4	3	3
Total	16	20	12	15	19	23	25	26	26
Net annual growth	98	107	143	255	280	295	299	302	297
Mortality	71	73	93	76	96	101	102	105	105
Roundwood supplies[2]									
From sawtimber	14	18	10	13	14	18	19	22	22
From other sources[3]	1	1	2	4	([5])	([5])	([5])	([5])	([5])
Total	15	19	12	17	14	19	20	22	22
Inventory of sawtimber[4]	8,983	9,633	9,964	9,790	12,341	12,855	13,481	14,028	14,541

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.
[5]Less than 0.5 million board feet.

subject to harvesting constraints and the unregulated lands have no scheduled timber harvests. On standard lands, harvesting is undertaken with due consideration for non-timber resource values.

Trends in Timber Supplies. Timber harvests in the Pacific Coast have followed the upward trends in other sections rising fairly rapidly between 1962 and 1976 (tables 7.27 and 7.28, fig. 7.8). The largest increase in harvests was in the Douglas-fir region (Append. 4, tables 4.17-4.20). There was also substantial growth in harvests in the ponderosa pine region (Append. 4, tables 4.21-4.24), but those in the Pacific Southwest dropped (Append. 4, tables 4.25-4.28).

There were also contrasting trends in harvests among the major ownerships (tables 7.29 and 7.30). The largest part of the increase between 1952 and 1962 was on the National Forests and other public ownerships. Harvests on the forest industry ownerships increased from 1962 to 1976. There was a declining trend on the farmer and other private ownerships—harvests in 1976 were less than half of what they were in 1952.

The projections of softwood timber supplies in the Pacific Coast represent a change from recent trends—they drop sharply by 1990. The decrease is largest for softwood sawtimber products—projected supplies in 1990 are 21.1 billion board feet, more than 3.3 billion below the 1976 level. By 2030, they are projected to decline another 2.5 billion to 18.6 billion board feet. Roundwood supplies show an initial decline, then increase slowly after 2000.

The falloff in projected softwood sawtimber product supplies is concentrated in the Douglas-fir region. In this region, the supplies are projected to drop by 17 percent by 1990; by 2030, projected output is 34 percent under current levels. Softwood sawtimber product supplies in the Pacific Southwest are projected to decline 7 percent by 1990, drop more slowly to 2010, then turn upward. In the ponderosa pine region, sawtimber product supplies, after an initial drop of about 9 percent by 1990, are projected to climb above recent levels.

The projected trends in terms of cubic feet of roundwood growing stock are different, due to the inclusion of

Table 7.24—*Roundwood supplies, net annual growth, and growing stock inventory in the Rocky Mountains, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	218	387	480	426	562	651	709	751	765
Net annual growth	688	775	904	1,044	1,074	1,065	1,037	998	958
Inventory	57,992	62,957	63,800	65,051	69,570	73,095	75,876	77,870	79,328
Hardwoods									
Roundwood supplies	7	10	10	2	3	3	3	4	4
Net annual growth	31	37	50	66	67	66	65	64	60
Inventory	2,153	2,458	2,663	2,671	3,575	3,757	3,900	4,002	4,077
Other public									
Softwoods									
Roundwood supplies	72	78	78	85	79	79	78	78	78
Net annual growth	119	140	160	160	156	149	140	130	121
Inventory	9,908	10,124	10,372	10,396	11,359	12,068	12,698	13,232	13,671
Hardwoods									
Roundwood supplies	2	2	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	6	6	7	7	10	9	9	8	8
Inventory	451	504	544	544	584	620	652	680	703
Forest industry									
Softwoods									
Roundwood supplies	128	145	138	115	129	136	142	146	150
Net annual growth	79	92	105	104	102	103	104	106	109
Inventory	6,749	6,424	5,995	5,126	3,976	3,664	3,545	3,418	3,222
Hardwoods									
Roundwood supplies	(1)	(1)	1	1	1	1	1	1	1
Net annual growth	1	1	1	1	5	5	5	5	6
Inventory	60	62	62	38	64	102	140	177	225
Farmer and other private									
Softwoods									
Roundwood supplies	79	74	118	147	136	142	147	149	151
Net annual growth	212	246	280	281	297	291	276	258	238
Inventory	12,808	13,599	14,246	14,362	16,520	17,344	17,785	17,980	18,103
Hardwoods									
Roundwood supplies	1	1	1	1	1	1	1	1	1
Net annual growth	19	23	26	26	16	15	15	13	13
Inventory	1,314	1,478	1,608	1,626	1,906	2,041	2,172	2,287	2,333
Total Rocky Mountains									
Softwoods									
Roundwood supplies	496	684	814	773	906	1,008	1,076	1,125	1,143
Net annual growth	1,097	1,253	1,449	1,589	1,629	1,607	1,557	1,493	1,427
Inventory	87,457	93,104	94,413	94,935	101,425	106,171	109,903	112,500	114,324
Hardwoods									
Roundwood supplies	11	14	12	4	5	5	5	6	5
Net annual growth	57	66	84	100	98	96	94	91	87
Inventory	3,978	4,502	4,877	4,879	6,129	6,519	6,865	7,147	7,338

[1]Less than 0.5 million cubic feet.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

small trees not in the sawtimber data. In terms of roundwood, the Pacific Southwest and ponderosa pine regions show substantial increases in supplies by 2030; in the Douglas-fir region a 14-percent decline is projected.

The projected decrease in softwood timber supplies in the Pacific Coast is concentrated on the forest industry ownerships.[17] The old-growth softwood forests in these ownerships are being liquidated and harvests from second-growth stands cannot offset the decline in supplies from old growth stands for at least

[17] Beuter, John H., K. Norman Johnson and Lynn Scheurman. Timber for Oregon's tomorrow. Forestry Research Lab., School of Forestry, Oregon State Univ., Corvallis, Oreg. 11 p. 1976.

Gedney, Donald R., Daniel D. Oswald, and Roger D. Fight. Two projections of timber supply in the Pacific Coast States. U.S. Dep. Agric. Forest Serv., Resour. Bull. PNW-60. Pacific Northwest Forest and Range Experiment Station, Portland, Oreg. 40 p., illus. 1975.

U.S. Comptroller General. Projected scarcities in the Pacific Northwest: a critique of 11 studies. EMD 79-5. Washington, D.C. Dec. 12, 1978.

Table 7.25—*Sawtimber supplies, net annual growth, and sawtimber inventory in the Rocky Mountains, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	1,362	2,377	2,864	2,560	2,913	3,303	3,518	3,647	3,662
Net annual growth	2,576	2,773	3,179	4,405	4,265	4,496	4,619	4,648	4,630
Inventory	250,206	263,322	260,387	260,758	270,444	278,058	285,216	291,598	297,795
Hardwoods									
Sawtimber supplies	10	13	10	9	9	13	14	15	15
Net annual growth	49	55	87	198	173	180	185	189	188
Inventory	4,583	5,000	5,172	5,020	6,959	7,157	7,341	7,503	7,665
Other public									
Softwoods									
Sawtimber supplies	451	470	490	509	393	388	385	384	383
Net annual growth	451	509	555	558	672	686	685	674	658
Inventory	44,892	43,452	42,699	42,774	45,660	48,335	51,134	53,897	56,515
Hardwoods									
Sawtimber supplies	1	2	1	2	1	1	1	1	1
Net annual growth	10	11	12	12	27	27	28	27	27
Inventory	1,043	1,111	1,155	1,155	1,175	1,244	1,316	1,387	1,455
Forest industry									
Softwoods									
Sawtimber supplies	814	897	887	729	648	667	682	689	700
Net annual growth	376	413	445	444	477	481	486	495	505
Inventory	33,685	30,419	27,140	23,260	17,992	16,273	15,598	14,971	14,177
Hardwoods									
Sawtimber supplies	1	1	[1]	2	3	4	4	4	4
Net annual growth	3	3	3	3	19	23	21	20	19
Inventory	250	222	197	122	205	321	434	540	709
Farmer and other private									
Softwoods									
Sawtimber supplies	506	452	687	850	554	570	583	594	602
Net annual growth	762	846	919	930	993	1,034	1,054	1,047	1,022
Inventory	52,012	52,632	53,160	53,587	58,877	59,009	61,924	62,950	63,870
Hardwoods									
Sawtimber supplies	3	3	1	4	2	2	2	3	3
Net annual growth	36	38	41	42	62	65	65	65	63
Inventory	3,107	3,299	3,438	3,493	4,002	4,134	4,389	4,597	4,713
Total Rocky Mountains									
Softwoods									
Sawtimber supplies	3,133	4,196	4,928	4,648	4,507	4,929	5,167	5,314	5,347
Net annual growth	4,166	4,541	5,098	6,337	6,407	6,697	6,845	6,865	6,815
Inventory	380,795	389,825	383,386	380,379	392,973	401,675	413,872	423,415	432,357
Hardwoods									
Sawtimber supplies	15	19	12	17	14	19	20	22	22
Net annual growth	98	107	143	255	280	295	299	302	297
Inventory	8,983	9,633	9,964	9,790	12,341	12,855	13,481	14,028	14,541

[1]Less than 0.5 million board feet.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

several decades. There is also a drop in sawtimber harvests on other public ownerships, chiefly those in the Douglas-fir region, although the decline is small in comparison to that on the forest industry ownerships. There is some increase in supplies on the farmer and other private ownerships. On the National Forests, supplies show an initial and fairly substantial increase, then after 2020 a slow decline in sawtimber product supplies.

The varying trends in projected supplies among the major ownerships in the Pacific Coast section result in some significant shifts in the importance of these ownerships as sources of softwood timber, as shown in the tabulation on the following page.

These data indicate that an increasing proportion of the section's timber supplies will come from the National Forests, farmer and other private ownerships, and the other public ownerships. The part coming from the forest industry ownerships shows an offsetting decrease.

The projected reduction in softwood timber harvests in the Pacific Coast has implications that go beyond the impacts on the affected ownerships. Such a reduction in harvests will result

Table 7.26—*Area of commercial timberland in the Pacific Coast (excluding Alaska), by region and ownership, 1952, 1962, 1970, and 1977, with base level projections to 2030*

(Million acres)

Item	1952	1962	1970	1977	Projections 1990	2000	2010	2020	2030
Pacific Northwest[1]									
Douglas-fir subregion									
(Western Washington and western Oregon)									
National Forest	7.0	7.3	7.2	6.8	6.2	6.1	6.0	6.0	5.9
Other public	5.1	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.2
Forest industry	6.9	7.2	7.2	7.5	7.5	7.5	7.5	7.4	7.4
Farmer and other private	6.3	5.8	5.5	4.5	4.1	3.7	3.5	3.3	3.2
Total	25.2	25.1	24.6	23.4	22.2	21.7	21.3	20.9	20.7
Ponderosa Pine subregion									
(Eastern Washington and eastern Oregon)									
National Forest	9.9	10.4	10.3	10.0	8.7	8.6	8.6	8.5	8.4
Other public	3.7	2.8	2.8	2.9	2.9	2.8	2.8	2.8	2.8
Forest industry	2.2	2.2	2.4	2.4	2.3	2.3	2.3	2.3	2.3
Farmer and other private	3.9	4.0	3.6	3.4	3.4	3.4	3.3	3.3	3.3
Total	19.6	19.4	19.1	18.7	17.3	17.2	17.0	16.9	16.8
Pacific Southwest[2]									
National Forest	8.4	8.9	9.0	8.2	7.1	6.8	6.7	6.7	6.7
Other public	1.2	1.0	.9	1.0	1.0	.9	.9	.9	.9
Forest industry	2.2	2.4	2.7	2.7	2.8	2.9	2.9	2.9	2.9
Farmer and other private	6.5	5.9	5.5	5.4	5.1	4.9	4.8	4.7	4.7
Total	18.2	18.3	18.0	17.3	16.0	15.5	15.4	15.3	15.2
Total Pacific Coast									
National Forest	25.3	26.6	26.4	25.0	22.0	21.5	21.3	21.2	21.0
Other public	10.0	8.7	8.5	8.5	8.3	8.1	8.0	7.9	7.9
Forest industry	11.2	11.9	12.3	12.5	12.6	12.8	12.7	12.6	12.6
Farmer and other private	16.6	15.7	14.6	13.4	12.6	11.9	11.6	11.4	11.3
Total	63.1	62.8	61.8	59.4	55.5	54.5	53.7	53.1	52.8

[1]Excludes Alaska.
[2]Includes Hawaii.

Note: Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, and the projection years are as of January 1.

in closed mills and losses in employment and income, with associated disruptions in many timber dependent communities in forested rural areas.[18] There will also be intensified pressure for the accelerated harvesting of old-growth stands on public ownerships and especially on the National Forests, which contain most of the remaining old-growth timber. The impacts of the drop in harvests are likely to be particularly strong in the Douglas-fir region. However, the other regions in the Pacific Coast and those in other sections of the country are also likely to be affected in various ways.

In 1976, about 9 percent of the softwood sawtimber products harvested in the Pacific Coast, or 2.1 billion board feet, came from non-growing stock sources such as dead, rough, and rotten trees. There are large volumes of such timber in the old-growth stands in this section. With the high demand for stumpage and limitations on timber supplies, the harvest of timber from this non-growing stock material is projected to rise to 3.4 billion board feet in 1990. As the old-growth stands are harvested and replaced by young stands, there will be less and less dead and rough and rotten timber to utilize. Accordingly, the supplies of softwood sawtimber from non-growing stock sources progressively decline. By 2030, it will amount to 1.9 billion board feet, less than the cut from this source in 1976. The outlook for roundwood supplies from non-growth stock in terms of proportion and trends is much the same as that for sawtimber.

Harvests of hardwood timber on the Pacific Coast rose in the 1952-76 years, but the volume in 1976 was only 97 million cubic feet, about 3 percent of the total harvests in the section. Projected hardwood timber supplies show some rise through the early decades of the projection period, then a slow decline. The volumes continue to be small, less than 140 million cubic feet in all projection years.

Trends in Timber Removals. Most of the timber removals in the Pacific Coast result from harvesting timber products. Thus, the historical and projected trends in timber removals in total, and by region and ownership, are very similar to those described above for timber harvest and supplies.

Between 1952 and 1976, there was no well-defined trend in logging residues from softwood growing stock; the vol-

[18] Oswald, Daniel D., Prospects for sawtimber output in California's North Coast, 1975–2000. U.S. Dep. Agric., Forest Serv., Resour. Bull. PNW-74, Pacific Northwest Forest and Range Experiment Station, Portland, Oreg. 20 p. 1978.

Ownerships	*Percentage distribution of major ownerships as a source of timber* Roundwood 1976	2030	Sawtimber products 1976	2030
National Forest	29	38	29	43
Other public	14	17	15	19
Forest industry	46	29	46	23
Farmer and misc. private	10	15	10	16
Total	100	100	100	100

Table 7.27—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the Pacific Coast (excluding Alaska and Hawaii), by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock									
Roundwood products	2,961	2,963	3,351	3,434	2,997	3,038	3,107	3,194	3,277
Logging residues	411	377	458	395	324	292	262	248	232
Other removals[1]	98	95	98	91	998	406	210	186	116
Total	3,470	3,435	3,907	3,920	4,319	3,736	3,579	3,627	3,625
Net annual growth	1,917	2,319	2,760	2,872	3,127	3,340	3,540	3,684	3,762
Mortality	1,319	1,252	994	837	801	800	816	840	871
Roundwood supplies[2]									
From growing stock	2,961	2,963	3,351	3,434	2,997	3,038	3,107	3,194	3,277
From other sources[3]	420	397	337	325	573	507	460	413	384
Total	3,381	3,360	3,688	3,759	3,570	3,545	3,567	3,607	3,662
Inventory of growing stock[4]	207,580	198,359	188,012	178,510	160,175	155,578	154,315	154,613	156,042
HARDWOODS									
Removals from growing stock									
Roundwood products	30	54	77	86	110	118	120	119	116
Logging residues	12	19	29	29	31	24	20	18	16
Other removals[1]	3	5	7	6	82	76	48	39	24
Total	45	78	113	121	224	218	189	176	156
Net annual growth	297	382	478	480	305	225	175	147	129
Mortality	60	74	76	79	142	165	181	191	200
Roundwood supplies[2]									
From growing stock	30	54	77	86	110	118	120	119	116
From other sources[3]	5	7	5	11	15	16	17	17	17
Total	35	61	82	97	126	134	137	136	133
Inventory of growing stock[4]	9,904	12,222	14,976	14,215	16,604	17,133	17,217	17,054	16,833

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

ume fluctuated around 400 million cubic feet. In contrast, logging residues from sawtimber showed a pronounced downward trend after 1962. Such a downward trend is projected to continue through 2030 for both sawtimber and growing stock. Part of the projected drop is due to the decreasing importance of old-growth stands, which contain large volumes of defective timber. Part of it is also due to improvements in utilization and a decline in harvest levels, especially for sawtimber.

In contrast to the trends in products and logging residues, other removals show a large jump between 1976 and 1990, but then decline through the remaining decades of the projection period. The pattern reflects the assumptions on changes in commercial timberland area—the timber on lands diverted to other uses is deducted from total inventories as other removals in projections.

The jump in other removals between 1976 and 1990 is expected to result mainly from the shift of National Forest lands to wilderness. From year to year, the actual removals from such shifts are likely to vary greatly depending on Congressional direction. The projections for 1990 and subsequent decadal years are averages of the preceding decades.

As indicated in preceding parts of this chapter, timber removals expressed as a percent of timber inventories provide some measure of the degree to which the productive capability of the timber resource is being utilized. In a situation such as exists on the Pacific Coast, where large volumes of timber are taken from inventories in the form of other removals resulting from land use changes, this relationship is distorted. When the other removals are deducted, the product and logging residue components of removals are about 2.1 percent of the softwood roundwood inventory, and 2.4 percent of the softwood sawtimber inventory in 1976. These percentages rise slightly by 2030.

Removals as percentages of inventories on the Pacific Coast are substantially below those in the South, the Nation's other major softwood timber producing area. This reflects in large part differences in ownerships. Much of the timber in the Pacific Coast section is in National Forests and other public ownerships which are not particularly responsive to price changes. The bulk of that in the South, on the other hand, is

Table 7.28—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the Pacific Coast (excluding Alaska and Hawaii), by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber									
Roundwood products	19,785	19,100	22,083	22,381	17,769	17,388	17,099	16,888	16,691
Logging residues	1,794	1,786	1,451	1,251	959	834	719	653	589
Other removals[1]	603	576	622	553	6,215	2,421	1,202	1,032	627
Total	22,182	21,462	24,156	24,185	24,942	20,643	19,021	18,573	17,907
Net annual growth	9,752	11,221	14,204	14,755	15,015	15,577	16,143	16,518	16,617
Mortality	7,251	6,553	5,067	4,247	4,039	3,830	3,702	3,632	3,606
Roundwood supplies[2]									
From sawtimber	19,785	19,100	22,083	22,381	17,769	17,388	17,099	16,888	16,691
From other sources[3]	2,537	2,666	2,075	2,082	3,365	2,878	2,508	2,169	1,945
Total	22,322	21,766	24,158	24,463	21,134	20,265	19,607	19,057	18,636
Inventory of sawtimber[4]	1,229,484	1,129,559	1,045,099	983,080	841,179	781,326	740,931	711,924	692,203
HARDWOODS									
Removals from sawtimber									
Roundwood products	114	179	295	310	373	399	407	394	381
Logging residues	25	50	53	56	51	39	33	29	26
Other removals[1]	9	17	24	25	300	263	172	138	83
Total	148	246	372	391	724	701	613	561	489
Net annual growth	923	1,241	1,508	1,451	937	673	508	399	330
Mortality	184	216	226	217	406	457	487	501	510
Roundwood supplies[2]									
From sawtimber	114	179	295	310	373	399	407	394	381
From other sources[3]	12	20	22	51	48	51	56	57	55
Total	126	199	317	361	420	451	462	451	435
Inventory of sawtimber[4]	29,317	37,199	45,653	42,057	48,763	49,851	49,476	48,160	46,568

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

in private ownerships which are more responsive.

Trends in Net Annual Growth. Net annual growth of softwood growing stock in the Pacific Coast section rose from 1.9 billion cubic feet in 1952 to 2.9 billion in 1976, an increase of 50 percent. Over the same period, softwood sawtimber growth increased 51 percent to 14.8 billion board feet. Most of the increase in growth occurred between 1952 and 1970.

In general, the trends in net annual growth by region and by ownership followed the sectional trends. There was however, a small decline in the ponderosa pine region and on the farmer and other private and National Forest ownerships between 1970 and 1976.

The increases in net annual growth are due in part to the replacement of old-growth stands, where net annual growth is low, with fast-growing young stands. It also reflects in part a fairly large reduction in mortality. This reduction is partly a response to the replacement of the old-growth stands and partly reduced losses resulting from better protection against wildfire, insects, and diseases.

Net annual growth is projected to continue to increase, although at progressively slower rates. By 2030, net annual growth of softwood growing stock is 3.8 billion cubic feet, or 31 percent more than in 1976, and that of sawtimber is 16.6 billion board feet, 13 percent higher. These increases are almost entirely in response to the higher net growth levels in the second growth stands that are replacing the old-growth.

Increases in net annual growth are projected for all regions. There are, however, different trends among the major ownerships. Nearly all of the projected increase in net annual softwood growth is on the public ownerships, mostly on the National Forests. Little change from 1976 levels is projected on farmer and other private ownerships. There is some increase in net annual growth of growing stock on forest industry ownerships but a decline for sawtimber.

Growth percentages on forest industry lands, however, are projected to increase substantially. For growing stock, they rise from 2.5 percent of the inventory in 1977 to 5.2 percent in 2030; and for sawtimber from 2.4 percent to 5.6 percent. These rates are considerably higher than those for the other

Table 7.29—*Roundwood supplies, net annual growth, and growing stock inventory in the Pacific Coast (excluding Alaska and Hawaii), by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	550	1,034	1,121	1,089	1,183	1,276	1,324	1,359	1,388
Net annual growth	603	693	907	902	1,066	1,212	1,340	1,431	1,464
Inventory	100,582	102,852	100,083	95,810	82,855	80,427	79,692	79,748	80,320
Hardwoods									
Roundwood supplies	1	4	9	2	3	5	8	9	11
Net annual growth	43	45	35	31	13	10	8	7	7
Inventory	2,120	2,302	2,352	2,171	2,141	2,160	2,157	2,123	2,073
Other public									
Softwoods									
Roundwood supplies	209	367	466	539	541	549	577	605	635
Net annual growth	273	418	461	481	552	597	636	669	698
Inventory	29,769	27,758	27,243	27,017	27,476	27,596	28,089	28,756	29,602
Hardwoods									
Roundwood supplies	5	4	10	14	20	20	20	20	20
Net annual growth	40	63	100	101	44	27	20	17	16
Inventory	1,353	1,774	2,352	2,605	3,119	3,150	3,099	3,031	2,973
Forest industry									
Softwoods									
Roundwood supplies	1,737	1,455	1,645	1,740	1,407	1,259	1,173	1,118	1,078
Net annual growth	489	572	675	830	860	896	916	917	913
Inventory	47,968	41,010	36,049	33,284	25,638	22,633	20,486	18,820	17,500
Hardwoods									
Roundwood supplies	20	25	40	37	51	56	56	53	49
Net annual growth	86	113	148	164	108	83	65	54	46
Inventory	2,236	3,124	3,999	4,034	5,139	5,530	5,655	5,633	5,575
Farmer and other private									
Softwoods									
Roundwood supplies	885	504	456	391	439	462	492	525	561
Net annual growth	552	636	717	659	649	636	647	667	687
Inventory	29,261	26,739	24,637	22,399	24,207	24,921	26,047	27,289	28,620
Hardwoods									
Roundwood supplies	8	28	23	44	52	53	54	54	53
Net annual growth	128	161	195	184	139	105	83	68	60
Inventory	4,195	5,022	6,273	5,405	6,204	6,293	6,306	6,267	6,212
Total Pacific Coast									
Softwoods									
Roundwood supplies	3,381	3,360	3,688	3,759	3,570	3,545	3,567	3,607	3,662
Net annual growth	1,917	2,319	2,760	2,872	3,127	3,340	3,540	3,684	3,762
Inventory	207,580	198,359	188,012	178,510	160,175	155,578	154,315	154,613	156,042
Hardwoods									
Roundwood supplies	35	61	82	97	126	134	137	136	133
Net annual growth	297	382	478	480	305	225	175	147	129
Inventory	9,904	12,222	14,976	14,215	16,604	17,133	17,217	17,054	16,833

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

ownership classes. On the National Forests, for example, the increase in growth rates for growing stock is projected to be from 0.9 percent to 1.8 percent and for sawtimber from 0.8 to 1.8 percent.

These differences reflect the substantial variation in the age of stands and the average per acre inventory that is now carried, and is projected to be carried, on forest industry and National Forest lands. They also reflect the fact that forest industry lands are generally on more productive sites than the National Forest lands.

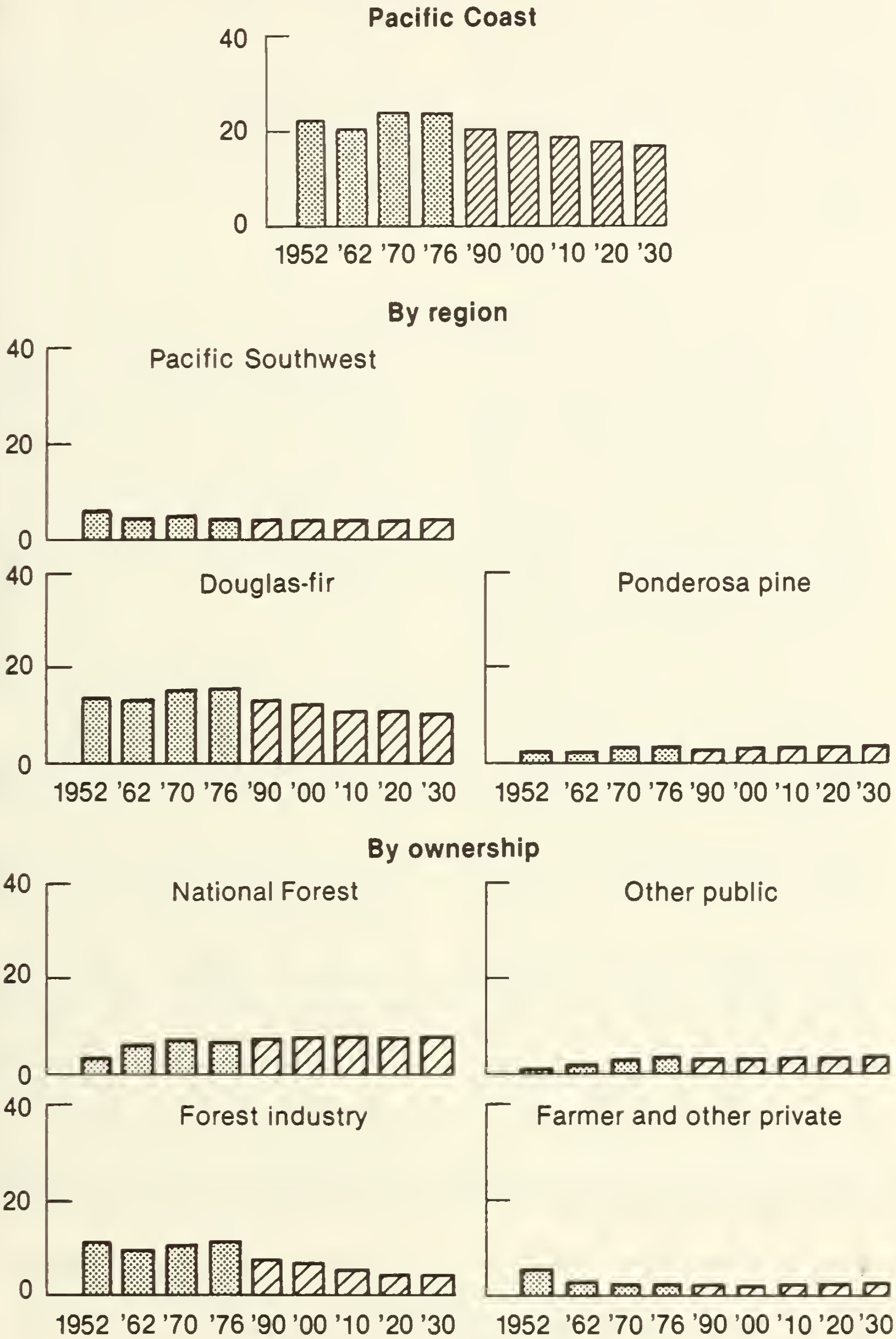
To some extent, the growth rates on industry lands in 1977 are understated because of the age-class distribution of the timber. Many stands on forest industry lands are still too young to have timber that meets merchantability standards for inclusion as measurable growth. These will grow into merchantable timber during the coming decades. The impact of such "ingrowth" will not be as great on National Forest or other lands in the section.

Trends in Mortality. Softwood mortality showed a considerable drop in the Pacific Coast section between 1952 and 1976, growing stock mortality fell from 1.3 to 0.8 billion cubic feet and sawtimber from 7.3 to 4.2 billion board feet.

Figure 7.8

Softwood Sawtimber Harvests in the Pacific Coast, 1952-76, with Projections of Supplies to 2030

Billion board feet, International ¼-inch log rule



The bulk of the decline was in the Douglas-fir region and Pacific Southwest regions.

The downward trends, which occurred in all three regions, were in part the result of the reduction in the area and volume of old-growth stands which have high natural mortality. They were also the result of improved protection from destructive agents.

During the early part of the projection period, further declines in mortality are expected, but this bottoms out in the case of roundwood which begins to show a slow rising trend after 2000. As in the base period, these projected trends reflect changes in inventories.

Trends in Inventories. In contrast to the North and South, timber inventories in the Pacific Coast have been trending downward in recent decades. The softwood growing stock inventory dropped 14 percent to 179 billion cubic feet between 1952 and 1977, and the softwood sawtimber inventory decreased 20 percent to 983 billion board feet. Hardwood inventories rose from 9.9 billion cubic feet in 1952 to 14.2 billion in 1977. Despite the increase during this period, hardwoods were only 8 percent of the softwood inventory in 1977.

For the future, the inventory of softwood growing stock is projected to decrease until 2010 and then increase slowly to 156 billion cubic feet in 2030. The inventory of softwood sawtimber, on the other hand, is projected to continue to fall through the projection period. Much of the decline is due to the harvesting of old-growth stands which usually have high volumes of timber per acre.

As noted earlier, some of the reduction will also be the result of wilderness and other withdrawals from the timberland base. These withdrawals are expected to be completed in large part by the end of the century. These expectations are shown in the fairly rapid decline in growing stock inventories to 2000, followed by a slower decline, then a slow rise to 2030.

There are substantial differences among ownerships in the rate at which timber inventories have been declining and are projected to decline in the future. Inventories of both growing stock and sawtimber fell most rapidly on forest industry and farmer and other private ownerships from 1952 to 1977. This largely reflects differences in accessibility and owner objectives. Forest industry and the farmer and other private ownerships have the most accessible timberlands, and those that are most economical for timber harvesting. In addition, forest industry and farmer and other private timberland owners have been most responsive to price increases.

With respect to the future, inventories on the forest industry ownerships continue to drop rapidly and particularly in the early decades of the projection period. Softwood sawtimber inventories, for example, drop from 182 billion board feet in 1977 to 100 billion in 2000, then on down to 58 billion in 2030. The inventories on the farmer

Table 7.30—*Sawtimber supplies, net annual growth, and sawtimber inventory in the Pacific Coast (excluding Alaska and Hawaii), by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	3,765	6,895	7,655	7,121	7,517	7,948	8,051	8,041	7,978
Net annual growth	2,880	3,239	4,637	4,444	5,204	5,828	6,363	6,723	6,821
Inventory	597,126	595,880	566,120	544,581	458,246	428,305	406,946	390,367	377,515
Hardwoods									
Sawtimber supplies	9	13	38	8	12	19	30	35	37
Net annual growth	121	141	98	90	30	13	7	3	2
Inventory	6,415	7,388	7,765	8,332	8,101	7,939	7,693	7,335	6,932
Other public									
Softwoods									
Sawtimber supplies	1,423	2,437	3,199	3,756	3,336	3,290	3,360	3,411	3,474
Net annual growth	1,844	2,206	2,450	2,520	2,864	3,044	3,200	3,323	3,428
Inventory	173,880	158,067	150,796	146,678	143,408	139,387	137,531	136,880	137,443
Hardwoods									
Sawtimber supplies	23	10	40	58	71	71	71	70	71
Net annual growth	141	207	302	295	144	91	68	55	50
Inventory	3,768	5,136	6,865	7,706	9,179	9,195	8,961	8,639	8,305
Forest industry									
Softwoods									
Sawtimber supplies	11,442	9,362	10,597	11,228	7,835	6,502	5,551	4,834	4,278
Net annual growth	2,497	2,854	3,475	4,424	3,895	3,758	3,604	3,415	3,215
Inventory	299,671	241,655	205,528	181,887	125,727	100,431	81,739	67,779	57,505
Hardwoods									
Sawtimber supplies	73	84	153	126	169	185	183	170	153
Net annual growth	235	342	448	508	342	248	180	131	95
Inventory	7,126	9,689	12,117	10,868	14,151	15,164	15,281	14,825	14,190
Farmer and other private									
Softwoods									
Sawtimber supplies	5,692	3,072	2,707	2,358	2,446	2,526	2,646	2,771	2,906
Net annual growth	2,531	2,922	3,642	3,367	3,053	2,947	2,976	3,056	3,151
Inventory	158,807	133,957	122,655	109,934	113,798	113,203	114,715	116,899	119,741
Hardwoods									
Sawtimber supplies	21	92	86	169	169	174	177	176	174
Net annual growth	426	551	660	558	420	321	253	210	183
Inventory	12,008	14,986	18,906	15,151	17,331	17,554	17,540	17,362	17,140
Total Pacific Coast									
Softwoods									
Sawtimber supplies	22,322	21,766	24,158	24,463	21,134	20,265	19,607	19,057	18,636
Net annual growth	9,752	11,221	14,204	14,755	15,015	15,577	16,143	16,518	16,617
Inventory	1,229,484	1,129,559	1,045,099	983,080	841,179	781,326	740,931	711,924	692,203
Hardwoods									
Sawtimber supplies	126	199	317	361	420	451	462	451	435
Net annual growth	923	1,241	1,508	1,451	937	673	508	399	330
Inventory	29,317	37,199	45,653	42,057	48,763	49,851	49,476	48,160	46,568

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

and other private ownerships rise from 2000 through 2030.

Of the four ownership categories, the National Forests had the smallest decline in timber inventories, 5 percent for softwood growing stock and 9 percent for softwood sawtimber, from 1952 to 1977. In part, this is due to the limited demand for National Forest timber during the early part of the base period. The projected inventories show a sharp drop by 1990 then a slow fall over the rest of the projection years, except growing stock which turns up after 2010.

Part of the drop in inventories on the National Forests is due to improved accessibility of timber and better markets relative to the 1950's and 1960's. Part of the fallout between 1976 and 1990 is due to the effect of wilderness withdrawals that are expected to be made during this time.

Growing stock inventories on the other public ownerships rise throughout the projection period. Sawtimber inventories, however, continue to drop until after 2020, when a rising trend begins.

As a result of the trends described above, the character of the softwood timber resource in the Pacific Coast will have changed greatly by 2030. As

noted, there will be little or no old-growth timber remaining on forest industry lands and relatively little on the farmer and other private holdings. Although there will still be substantial areas of old-growth timber on the National Forests, sawtimber growth and removals will be coming more into balance and the objective of a sustained level of harvest beginning with the old-growth stands with a gradual transition to second-growth stands will have been realized. Similar objectives on the other public ownerships are also being achieved.

Projected Changes in Timber Resources in Alaska

Alaska contains 119 million acres of forest land, about one-sixth of that in the United States. However, at the present time, only 11.1 million acres, some 9 percent of the State total, is classified as commercial timberland. Of this area, some 7.0 million acres is in coastal Alaska. The remaining 4.1 million acres are in the Alaska interior. Much more of interior Alaska will be classified as commercial timberland when more intensive inventories are completed.

Timber harvesting increased rapidly in coastal Alaska between 1952 and 1970, but at its highest level, 0.1 billion cubic feet, it has represented only about 1 percent of U.S. production. Timber harvesting in the interior of Alaska has been very small, and nearly all of this has been consumed locally.

The increase in harvesting in coastal Alaska is largely a response to growth in pulp and lumber exports, nearly all to Japan. High manufacturing costs and provisions of the Jones Act, which require that shipments from Alaska to the contiguous States be on U.S. ships, have limited sales of Alaskan timber products in the contiguous States.

The projections of changes in timber resources in this study cover only the coastal region. No attempt has been made to project quantified changes in timber resources in interior Alaska because of the lack of adequate inventories of the timber resource; and the uncertainties about proposals to use large areas for wilderness, wildlife refuges, and other purposes not consistent with timber production; and the concentration of timber harvesting in coastal areas. However, and as described in a following section, the forests in the interior have the potential to contribute in a significant way to timber supplies and this may in fact happen well before the end of the projection period.

There is also a lot of uncertainty about the projected changes in coastal Alaska because of the changes in ownership that are now taking place in commercial timberland ownership. For example, no one knows how the timber resources being transferred to Alaskan Native corporations will be managed, on a sustained yield basis as assumed in this analysis, or in some other way including the rapid liquidation of the existing inventories. It seems likely that important changes will be made and the following projections should be viewed accordingly.

Trends in Commercial Timberland Area in Coastal Alaska. The area of commercial timberland in coastal Alaska dropped from 7.4 million acres in 1952 to 7.3 million in 1962, and remained there until the 1970's when there was a further decline to 7 million acres (table 7.31). This last drop was due largely to wilderness withdrawals from National Forest lands. In 1977, the National Forests accounted for 6.5 million acres or 93 percent of the total commercial timberland area. Most of the remaining half-million acres was in other public ownership.

The commercial timberland area in coastal Alaska is projected to decline by 29 percent between 1977 and 2030 to 5.0 million acres. Most of the reduction will result from the designation of 1.9 million acres of National Forest commercial timberland as wilderness. An additional 0.2 million acres of National Forest land is projected to be transferred to the State and 0.7 million acres to Alaskan Native ownership, now classified as farmer and other private. The National Forest ownership, therefore, is projected to fall to 3.7 million acres or 74 percent of the total for coastal Alaska in 1990. Forest industry ownership is expected to remain negligible although in time part of the land transferred to Alaskan Natives may be sold to forest industries. No sizable area changes are expected beyond 1990.

Trends in Timber Supplies in Coastal Alaska. Almost all of the timber on commercial timberland in coastal Alaska is softwood and practically all of this is on lands that have never been harvested. There is little second-growth timber that is old enough to affect growth figures at the present time, although this will change over the projection period. Thus, the presence of large areas of slow-growing, old-growth timber with fairly large per acre inventories dominates the timber resource in coastal Alaska even more than in the Pacific Coast section.

Softwood roundwood harvests from this resource increased from 14 million cubic feet in 1952 to 119 million in 1970 (table 7.32). Softwood sawtimber product harvests during the same period rose from 99 million board feet to 754 million (table 7.33). The major force behind this increase in timber harvest was the development of a market for lumber and wood pulp in Japan. This provided the first substantial opportunity to utilize the timber resources of coastal Alaska.

Table 7.31—*Area of commercial timberland in Coastal Alaska, by ownership, 1952, 1962, 1970, and 1977, with base level projections to 2030*

(Million acres)

Ownership	1952	1962	1970	1977	Projections 1990	2000	2010	2020	2030
National Forest	6.9	6.8	6.8	6.5	3.7	3.7	3.7	3.7	3.7
Other public	.5	.5	.5	(1)	.7	.7	.7	.7	.7
Forest industry	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Farmer and other private	(1)	(1)	(1)	(1)	.7	.7	.7	.7	.7
Total	7.4	7.3	7.3	7.0	5.0	5.0	5.0	5.0	5.0

[1]Less than 0.5 million acres.

Note: Data for 1952 and 1962 are as of December 31. Data for 1970, 1977, and the projection years are as of January 1.

Almost all of the timber in coastal Alaska is softwood, and practically all of this is on lands that have never been harvested.

Harvests in 1976 were below those in 1970. This was caused primarily by depressed export markets for cants and wood pulp. The National Forests were the source of nearly all the timber harvested in the 1952-76 period (tables 7.34 and 7.35).

The drop in timber harvests between 1970 and 1976 was from growing stock; harvests of timber from sources other than growing stock, such as dead trees, increased substantially.

For the future, timber supplies from growing stock are expected to increase and by 2030 be nearly twice the harvest in 1976. Most of this projected growth takes place by 1990. The volume of timber obtained from dead trees and similar sources is also expected to increase, but slowly.

Most of the projected increase in timber supplies comes from the National Forests. However, the National Forest share of the timber supply declines from 94 percent of the total in 1976 to 76 percent in 2030. This is largely the result of the projected shift in acreage out of this ownership. Beyond 1990, it is also constrained by harvest ceilings.

The timber supplies from other public and from farmer and other private ownerships are projected to rise substantially above 1976 levels. However, just as there is now uncertainty concerning the final acreage adjustments among ownerships as a result of the State and Native land selections, it is also uncertain how the new owners will manage the newly claimed lands. Implicit in these projections is the assumption that the lands will be harvested in a manner similar to the way they were handled under National Forest management. But in fact, these ownerships may follow much different harvesting and marketing strategies. It seems likely, for example, that capital shortages and other pressures will lead to accelerated harvesting on part of the lands transferred to the Alaskan Natives corporations. This could be offset, however, by the use of part of this land for purposes other than timber production.

Just as in the past, much of the future timber harvest will probably enter the export market. Restrictions on the export of logs from National Forest lands have led to an export trade in manufactured cants, as well as woodpulp. It looks like this will change as National Forest lands are transferred to other ownerships. The export of logs from these ownerships, and especially the Alaskan Native ownerships, may well amount to a substantial volume.

Trends in Timber Removals in Coastal Alaska. Timber products harvest accounts for the bulk of the timber removals in coastal Alaska and, accordingly, the historical and projected trends in removals are very similar to the trends described for timber supplies. Because of the large volumes of defective and cull timber in the old-growth stands, logging residues have composed and are expected to continue to compose a significant part of total removals.

Other removals, i.e., the removals resulting from land clearing and the diversion of commercial timberland to other uses such as wilderness and parks, were small in the base years. The jump shown for 1990 reflects expected interim decisions that would set aside commercial timberland for wilderness.

As percentage of inventory, growing stock and sawtimber removals have been very low. For example, even in 1970 when sawtimber removals were at their highest point for any of the survey years, they were only 0.4 percent of the sawtimber inventory. Although total removals will increase and timber inventories will decrease, partly as a result of wilderness withdrawals, projected removals of growing stock and sawtimber as a percentage of inventory will still be only 0.8 percent in 2030.

Trends in Net Annual Growth in Coastal Alaska. Largely because of the dominance of mature trees that are characteristic of old-growth forests, net annual growth in coastal Alaska has been very low both in terms of volume and as a percentage of inventory. However, net annual growth has been increasing and is projected to continue to increase as the old-growth stands are harvested and are replaced by second growth stands. Even so, net annual growth as a percentage of inventory will still be low, only 0.7 percent for growing stock and 0.4 percent for sawtimber by 2030.

Table 7.32—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in Coastal Alaska, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock									
Roundwood products	14	74	118	101	176	180	185	188	194
Logging residues	3	24	39	5	18	19	19	19	20
Other removals[1]	([5])	([5])	([5])	([5])	455[6]	4	4	4	2
Total	17	98	157	106	649	203	208	210	215
Net annual growth	11	17	21	24	41	62	89	130	173
Mortality	183	176	171	158	124	116	108	100	91
Roundwood supplies[2]									
From growing stock	14	74	118	101	176	180	185	188	194
From other sources[3]	([5])	1	1	8	11	11	12	12	12
Total	14	75	119	109	187	192	197	199	206
Inventory of growing stock[4]	41,599	41,039	40,373	38,189	30,092	28,698	27,521	26,625	26,090
HARDWOODS									
Removals from growing stock									
Roundwood products	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])
Logging residues	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])
Other removals[1]	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])
Total	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])
Net annual growth	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])
Mortality	3	3	3	2	2	2	2	2	2
Roundwood supplies[2]									
From growing stock	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])
From other sources[3]	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])
Total	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])	([5])
Inventory of growing stock[4]	395	395	394	385	385	385	386	386	386

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.
[5]Less than 0.5 million cubic feet.
[6]The large other removals in 1990 is largely the result of the significant acreage reduction between 1976 and 1990.

Net growth of growing stock per acre is projected to increase from 3 to over 30 cubic feet between 1976 and 2030, but these are small increments on an average inventory per acre of about 5000 cubic feet. Most of the commercial timberland in coastal Alaska is in the upper productivity classes. Thus, these lands do have the physical capacity to sustain large increases in timber growth.[19]

Trends in Mortality in Coastal Alaska. The gross annual growth in coastal Alaska has been largely offset by mortality—a situation that is typical of old-growth stands. As the old-growth stands have been cut, mortality has declined, and this is projected to continue as the forests gradually change to second-growth stands. By 2030, however, mortality is still relatively high, 0.4 billion board feet, because only about a third of the old-growth will have been cut. Moreover, it is likely that because of cost and accessibility problems, most of this mortality will not be utilized.

Trends in Inventories in Coastal Alaska. In line with the cutting of old-growth stands and the low levels of growth, timber inventories in coastal Alaska have been dropping slowly. This trend is expected to continue; sawtimber inventories in 2030 are projected at 115 billion board feet, some 61 billion board feet below 1976. Over half of this decrease, 37 billion board feet, takes place by 1990. The largest part of this consists of the reduction in inventory resulting from the shift of commercial timberland to wilderness use.

[19] For a further discussion of this point, see:

Taylor, R. F. Yield of second-growth western hemlock-sitka spruce stands in southeastern Alaska. U.S. Dep. Agric., Tech. Bull. 412, 29 p. 1934.

Harris, Arland S. and Wilbur A. Farr. The forest ecosystem of southeast Alaska—forest ecology and timber management. U.S. Dep. Agric., Forest Serv., Gen. Tech. Rep. PNW-25, 109 p., illus. 1975.

Hutchinson, O. Keith and Vernon J. LaBau. The forest ecosystem of southeast Alaska—timber inventory, harvesting, marketing and trends. U.S. Dep. Agric., Forest Serv., Gen. Tech. Rep. PNW-34, 57 p., illus. 1975.

Table 7.33—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in Coastal Alaska, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber									
Roundwood products	99	467	746	641	799	818	830	850	876
Logging residues	10	150	80	22	82	85	86	87	89
Other removals[1]	(5)	(5)	(5)	(5)	2,062[6]	18	16	16	8
Total	109	617	826	664	2,943	921	932	953	973
Net annual growth	32	66	90	111	153	200	275	369	494
Mortality	872	836	807	748	585	545	508	469	433
Roundwood supplies[2]									
From sawtimber	99	467	746	641	799	818	830	850	876
From other sources[3]	0	8	8	48	50	50	52	53	55
Total	99	475	754	689	849	868	882	903	931
Inventory of sawtimber[4]	190,794	187,967	184,688	174,604	137,267	130,416	124,023	118,214	113,263
HARDWOODS									
Removals from sawtimber									
Roundwood products	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Logging residues	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other removals[1]	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Total	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Net annual growth	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Mortality	9	9	9	9	9	9	9	9	9
Roundwood supplies[2]									
From sawtimber	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
From other sources[8]	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Total	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Inventory of sawtimber[4]	1,392	1,393	1,388	1,355	1,359	1,360	1,362	1,362	1,362

[1]Volume of timber removed in cultural operations such as noncommercial thinning and inventory losses resulting from the diversion of commercial timberland to other uses such as cropland, parks, and wilderness. The historical data are estimates of other removals in the indicated years. They do not include the removals associated with the diversion of commercial timberland, such as withdrawals for wilderness, that do not take place on a regular and continuing basis. The projected removals are annual averages for the decades preceding the indicated year and do include such removals.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[3]Include roundwood products from rough and rotten trees, dead trees, limbs, and trees on noncommercial and nonforest land.
[4]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.
[5]Less than 0.5 million board feet.
[6]The large other removals in 1990 is largely the result of the significant acreage reduction between 1976 and 1990.

This shift from commercial timberland to wilderness is all on the National Forests. In addition, and as described above, substantial acreages of National Forest lands are shifted to State and Alaskan Native ownerships. As a result, the inventory on the National Forests drops by over a third between 1976 and 1990. Part of this is offset by initial increases in inventories on the other public (State) and farmer and other private (Alaskan Natives) ownerships.

After 1990, the inventories on all ownerships decline, but at a progressively slower rate. This reflects a narrowing of the gap between removals and net annual growth, resulting from the gradual spread of rapidly growing second-growth stands.

Coastal Alaska's share of the U.S. softwood sawtimber inventory drops from 9 percent in 1977 to 5 percent by 2030. However, this inventory now contains about 85 percent of the Nation's Sitka spruce and greater proportions of Sitka spruce are expected in the second-growth stands. Thus the forests of coastal Alaska are likely to continue to be a major source of this kind of timber.

The Prospective Timber Situation in Interior Alaska. Interior Alaska has a much greater area of forest land (by some 10 times) than coastal Alaska and practically all of it has been in Federal ownership until quite recently. As in coastal Alaska, a large part of this forest land is being transferred to State and Alaskan Native ownerships. Substantial areas will, however, remain in Federal ownership.

There is considerable contrast between the coastal and interior forests of Alaska. The forests of the more climatically severe interior are composed largely of white spruce, black spruce, paper birch, trembling aspen, and balsam popular. Estimates from the timber inventory now underway of these forests show 4 million acres which meet the standards for commercial timberland. These lands contain an estimated 4.5 billion cubic feet of growing stock including 12.9 billion board feet of sawtimber. Substantial additional acreages and volume may be identified as commercial when the inventory is complete.

The interior Alaska forest lands are remote from markets and accessible

Table 7.34—*Roundwood supplies, net annual growth, and growing stock inventory in Coastal Alaska, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	13	72	105	102	142	145	149	151	156
Net annual growth	10	16	20	23	31	47	67	98	131
Inventory	38,850	38,228	37,555	35,414	22,866	21,795	20,901	20,209	19,792
Hardwoods									
Roundwood supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	248	248	246	237	293	293	293	293	293
Other public									
Softwoods									
Roundwood supplies	1	3	11	5	23	24	25	25	26
Net annual growth	1	1	1	1	5	7	11	16	21
Inventory	2,580	2,641	2,651	2,311	3,613	3,452	3,310	3,208	3,149
Hardwoods									
Roundwood supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	147	147	147	147	46	46	46	47	47
Forest industry									
Softwoods									
Roundwood supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	(1)	1	1	1	(1)	(1)	(1)	(1)	(1)
Hardwoods									
Roundwood supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Farmer and other private									
Softwoods									
Roundwood supplies	(1)	(1)	3	2	23	23	24	24	25
Net annual growth	(1)	(1)	(1)	(1)	5	7	11	16	21
Inventory	170	168	166	462	3,613	3,452	3,310	3,208	3,149
Hardwoods									
Roundwood supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	(1)	(1)	(1)	(1)	46	46	46	47	47
Total Coastal Alaska									
Softwoods									
Roundwood supplies	14	75	119	109	187	192	197	199	206
Net annual growth	11	17	21	24	41	62	89	130	173
Inventory	41,599	41,039	40,373	38,189	30,092	28,698	27,521	26,625	26,090
Hardwoods									
Roundwood supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	395	395	394	385	385	385	386	386	386

[1] Less than 0.5 million cubic feet.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

only through the river systems. Furthermore, their basic productivity is much lower than that of the coastal Alaska forests. Nevertheless, development of some of these lands for timber production is likely during the projection period.[20]

Until the last few years, timber harvesting in the interior has been primarily to meet localized needs and averaged less than 5 million board feet per year. This harvest has been almost entirely from the white spruce growing stock.

Prospects for the establishment of wood processing plants to meet local needs in Alaska are limited by its small, dispersed population. While Anchorage, the State's population and economic center, may be able to absorb some dimension stock manufactured from interior timber, this is not a large potential market outlet. In total, the Anchorage lumber market consumes 70 to 100

[20] Broathe, Peder, Delmar Dolmen and Aarne Nyyssoven. Forestry potential in interior Alaska. *In* North American forest lands at latitudes north of 60 degrees. Proc. of Symp., Univ. Alaska. p. 299–312. 1977.

Table 7.35—*Sawtimber supplies, net annual growth, and sawtimber inventory in Coastal Alaska, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	95	457	667	645	645	659	667	685	706
Net annual growth	30	61	84	103	117	152	209	281	374
Inventory	178,182	175,094	171,797	161,918	104,304	99,044	94,189	89,729	85,924
Hardwoods									
Sawtimber supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	872	873	867	835	1,033	1,033	1,034	1,034	1,034
Other public									
Softwoods									
Sawtimber supplies	4	18	67	34	102	104	107	109	112
Net annual growth	2	4	6	7	18	24	33	45	60
Inventory	11,835	12,098	12,127	10,568	16,481	15,686	14,917	14,243	13,670
Hardwoods									
Sawtimber supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	519	519	519	519	163	163	164	164	164
Forest industry									
Softwoods									
Sawtimber supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	(1)	5	5	5	(1)	(1)	(1)	(1)	(1)
Hardwoods									
Sawtimber supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Farmer and other private									
Softwoods									
Sawtimber supplies	(1)	(1)	20	10	102	104	107	109	112
Net annual growth	(1)	(1)	(1)	1	18	24	33	45	60
Inventory	778	769	759	2,113	16,481	15,686	14,917	14,243	13,670
Hardwoods									
Sawtimber supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	1	1	1	1	163	163	164	164	164
Total Coastal Alaska									
Softwoods									
Sawtimber supplies	99	475	754	689	849	868	882	903	931
Net annual growth	32	66	90	111	153	200	275	369	494
Inventory	190,794	187,967	184,688	174,604	137,267	130,416	124,023	118,214	113,263
Hardwoods									
Sawtimber supplies	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Net annual growth	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Inventory	1,392	1,393	1,388	1,355	1,359	1,360	1,362	1,362	1,362

[1]Less than 0.5 million board feet.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

million board feet of wood products per year but has traditionally depended on imports from the Puget Sound area. Approximately 10 million board feet of locally produced lumber is currently consumed annually, but this comes primarily from the south central coastal area rather than the interior. As the holdings of Alaskan Natives in the interior are developed, the competitive advantage now held by outside producers may change and Anchorage might provide a limited market for interior lumber.

As is the case with coastal forests, an expansion of log exports to Japan appears to be the best opportunity for utilizing the timber in the interior. In the past, round log exports were not permitted from Federal and State lands and there were few, if any, large private wood sources that could be purchased for export. As the Alaskan Natives gain title to extensive areas of timberlands, it is expected that limited markets for round logs will be developed. The Toghotthele Village Corporation of Nenana has already sold and shipped some logs to Japan and recently signed a contract of sale of 30 million board feet

for 3 years for export to Japan. Negotiations on additional sales are underway between other Native corporations and various Japanese timber and trading companies.

Alternative Projections and the Qualified Outlook

As indicated in various ways in the preceding discussion, there are many uncertainties associated with the assumptions and basic data used in making projections of changes in the timber resource. In recognition of this uncertainty, and as an illustration of the sensitivity of the projections to varying assumptions, a series of projections of timber supplies was prepared using alternative assumptions on commercial timberland areas and radial growth and mortality rates. The alternative assumptions bracketed the assumptions used in preparing the projections presented above.

The "high commercial timberland area" alternative started at the 1977 level and was gradually increased until by 2030 it was 5 percent above the assumed base level value. The "low area" alternative was gradually lowered until in 2030 it was 10 percent below the base. The same percentage area changes were made on all ownerships in all regions. In the case of public lands, harvest ceilings were changed in proportion to the assumed changes in area.

High and low alternatives for assumed growth and mortality rates were also tested. In the "high growth" alternative, radial growth rates were increased 10 percent above the estimated rates for 1977 and mortality rates were decreased 10 percent. The new assumed levels were maintained through the projection period, except as they were adjusted to reflect the effects of stand density. In the "low growth" alternative, radial growth rates were lowered 10 percent and mortality rates raised 10 percent in relation to the 1977 estimated rates and maintained at those levels through the projection period, except as influenced by stand density. Harvest ceilings on public lands were changed in proportion to the assumed changes in radial growth rates.

Supply projections made with the "high" and "low" area and radial growth and mortality rate assumptions for each section of the country were close to or within the range of change in the assumptions. That is, the assumed 5 percent increases or decreases in area led to changes in timber supplies of about 5 percent above or below the base level projections. Similarly, the assumed 10 percent increases or decreases in growth and mortality rates led to roughly similar changes in timber supplies above or below the base level projections.

Although the alternative projections of timber supplies were within or close to the ranges in the assumptions, it was not certain that they would be so prior to running the timber supply equations with the alternative area, radial growth, and mortality assumptions. The supply equations are sufficiently complex that such changes could have had unexpected and substantially greater or smaller effects. As a result of the tests, it can be concluded that differences in future conditions from those assumed in making the timber supply projections will lead to changes in timber supply that are approximately proportional to the extent of the differences.

Of course, the differences in the timber resource could be larger than those described in the sensitivity analysis. More intensive management could lead to higher levels of timber growth inventories. On the other hand, they could just as well be lower as a result of larger shifts in commercial timberland to other uses, more constraints on timber management associated with the protection of the environment and multiple-use, or extraordinary mortality losses. On the basis of the available information, there seems to be no way of determining that the projections are either high or low.

Thus, in appraising the projections that have been presented above, the basic objective of making them should be kept in mind—they are simply intended as indicators of future trends if the forests on commercial timberlands are cut and managed much as they have been in the last two decades or so. It is expected that future trends in the timber resource will be different, and perhaps quite different, from those described. In fact, following analyses will show that from the economic, social, and environmental points of view, it will be desirable to make major changes in policies and programs to bring this about.

The following analysis will also describe opportunities for changing the projected trends in the timber resource. These can be divided into two broad categories. First, there are vast biological opportunities to increase net annual timber growth and, with a time lag, timber inventories and supplies. A substantial part of these opportunities is economic, i.e., they would yield acceptable rates of return on the investment. Second are those opportunities to extend timber supplies through improvements in utilization including utilization of residues and the wood fiber in tree tops and limbs and trees in fence rows, urban areas, and on noncommercial forest land.

Chapter 8
Projected Timber
Demand-Supply Relationships

Chapter 8
Projected Timber Demand-Supply Relationships

The preceding chapters of this study have been largely concerned with the development of base level projections of demand for timber on domestic forests and the supply of timber that would be available for harvest if timber owners respond to stumpage price and inventory changes and manage their lands much as they have in the recent past. These projections are based on the further assumption that timber product prices and stumpage prices will rise through the projection period at the same rates as in the base period—1950-76—used in making the projections.

The base level projections of timber demands developed under these assumptions rise more rapidly than base level supplies. In a free competitive economy such as that operating in the timber sector, this means that prices will rise to the extent necessary to bring about an equilibrium between demands and supplies.[1] The basic purpose of this chapter is to determine the magnitude of the price increases necessary to achieve such an equilibrium between projected timber demands and supplies, and of the impacts on the timber resource of harvesting timber at the levels necessary to maintain this equilibrium. The effects of rising equilibrium stumpage and timber product prices on the timber industries, the economy, the society, and the environment are also explored.

In appraising the equilibrium projections of prices, changes in timber demands and supplies and the associated changes in the timber resource and timber-based industries, it should be kept in mind that these are, as are the base level projections, simulations of what would happen under the explicit and implied conditions. In response to the increases in equilibrium prices and concern about the social, economic, and environmental implications of such increases, it is expected that various actions will be taken to increase and extend timber supplies and reduce demands which will change the outlook in ways considered more desirable. In appraising the equilibrium projections, it should also be kept in mind that the basic purpose of the study is to provide foresight on developing timber problems and to do this in time to change policies and programs. The equilibrium analysis provides a means of quantifying potential price and resource changes in ways that facilitate this purpose.

Projected Softwood Timber Demand-Supply Relationships

The base level projections of demands on domestic forests for softwood roundwood—after allowances for imports and exports and improvements in utilization—rise from actual consumption of 9.5 billion cubic feet in 1976 to 13.8 billion in 2000 and 15.7 billion in 2030 (table 8.1, fig. 8.1). The base level projections of supplies of softwood roundwood from domestic forests under the assumptions specified earlier show moderate increases from 9.5 billion cubic feet in 1976 to 11.1 billion in 2000 and 12.3 billion in 2030. The outlook for softwood sawtimber is similar — large increases in demand under base level assumptions and modest increases in supplies.

It is evident from these comparisons of the base level projections of demands and supplies that a substantial rise in the relative prices of softwood stumpage and most softwood timber products beyond the levels assumed in preparing the base level projections will be necessary to balance demand and supplies in future decades. The rise in prices will be especially rapid in the

The projected increases in demands for softwood timber are much larger than the projected increases in supplies. This means that the Nation is faced with the prospect of substantial and continuing increases in prices of stumpage and most softwood timber products.

[1] In this study, equilibrium prices and quantities are determined by the intersection of supply and demand curves. The equilibrium prices are those prices at which the amount willingly supplied and the amount willingly demanded are equal. These prices and the associated equilibrium timber supply-demand projections were developed by means of regionally disaggregated economic simulation models. For further details, see: Adams, Darius M., and Richard W. Haynes. The 1980 softwood timber assessment market model: structure, projections, and policy simulations. Forest Sci., Monograph No. 22, 62 p. and Lange, William J. The 1980 hardwood timber assessment market model. Internal paper on file at the Pacific Northwest Forest and Range Experiment Station, Portland, Ore.

Table 8.1—*Softwood timber demand, exports, imports, and demand on and supply from domestic forests in the United States, 1952, 1962, 1970, and 1976, with projections (medium level demand) under alternative price assumptions to 2030*

(Billion cubic feet)

Item	1952[1]	1962[1]	1970[1]	1976[1]	Projections: Base level price trends[2] 1990	2000	2010	2020	2030	Projections: Equilibrium price trends[8] 1990	2000	2010	2020	2030
Total demand[4]	8.4	8.5	9.5	10.4	15.0	16.3	17.7	18.2	18.7	13.5	14.5	15.5	16.0	16.3
Exports[5]	.1	.4	1.3	1.6	1.3	1.2	1.1	1.0	.9	1.3	1.2	1.1	1.0	.9
Imports	1.4	1.7	2.1	2.5	3.7	3.7	3.9	3.9	3.9	3.2	3.6	3.6	3.5	3.2
Demand on domestic forests[6]	7.2	7.2	8.7	9.5	12.6	13.8	14.9	15.3	15.7	11.6	12.1	13.0	13.5	14.0
Supply from domestic forests[7]	7.2	7.2	8.7	9.5	10.4	11.1	11.6	12.0	12.3	11.6	12.1	13.0	13.5	14.0
Supply-demand balance	0	0	0	0	−2.2	−2.7	−3.3	−3.3	−3.4	0	0	0	0	0
(Billion board feet, International ¼-inch log rule)														
Total demand[4]	39.8	41.3	47.0	50.4	70.3	73.0	78.1	78.7	78.6	60.1	61.9	64.5	64.3	62.1
Exports[5]	.8	1.6	5.6	6.6	7.1	6.4	6.1	5.7	5.4	7.1	6.4	6.1	5.7	5.4
Imports	2.4	4.6	5.9	7.9	13.5	12.8	12.6	11.9	11.2	13.2	13.8	13.6	12.0	10.2
Demand on domestic forests[6]	38.1	38.3	46.7	49.1	63.9	66.6	71.6	72.5	72.8	54.0	54.5	57.0	58.0	57.3
Supply from domestic forests[7]	38.1	38.3	46.7	49.1	48.1	50.5	52.5	54.3	55.6	54.0	54.5	57.0	58.0	57.3
Supply-demand balance	0	0	0	0	−15.8	−16.1	−19.1	−18.2	−17.2	0	0	0	0	0

[1]Data are estimates of actual consumption or harvests and differ somewhat from the "trend" estimates shown in the preceding section on timber supplies.

[2]Projections show timber demand, imports and supply from domestic forests assuming that the price trends in the base period used in making projections (roughly from the late 1950's through the mid 1970's) continue through the projection period.

[3]Projections show timber demand, imports and supply from domestic forests assuming that prices rise enough to maintain an equilibrium between projected demand and supply.

[4]Total demand for products converted to a roundwood equivalent basis. The projections include adjustments for increased product yields per unit of roundwood input which are expected to result from improvements in utilization.

[5]Logs and those products manufactured directly from roundwood including pulp and pulp products.

[6]Total U.S. demand plus exports minus imports.

[7]The base level projections show the volume of timber available for harvest from domestic forests if recent trends in the forces determining supply, such as commercial timberland area, management and prices continue through the projection period.

Note: Data may not add to totals because of rounding.

Sources: Data for 1952, 1962, 1970, and 1976 based on information published by the U.S. Departments of Agriculture and Commerce.

Projections: U.S. Department of Agriculture, Forest Service.

1980's, when the projections of base level demands are rising twice as fast as base level supplies.

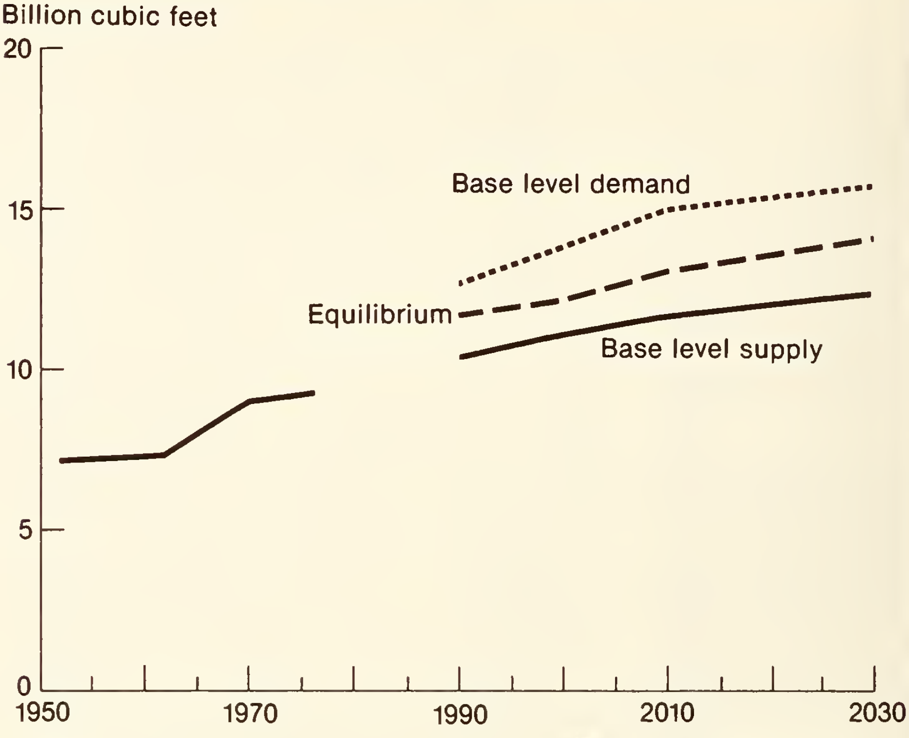
Trends in Equilibrium Softwood Stumpage Prices. Projections of the increases in regional softwood stumpage prices necessary to achieve this equilibrium are summarized in table 8.2 and figure 8.2.[2] These projections show softwood stumpage prices rising substantially in all regions although not uniformly.[3] In the southern regions, stumpage prices measured in 1967 dollars and net of inflation or deflation rise at an annual rate of 2.5 percent between 1976 and 2030.[4] This is considerably above the rate of increase in the Douglas-fir region of the Pacific Northwest (1.8 percent) and that in the northern regions (1.9 percent). It is, however, below those in the other regions and especially in the Rocky Mountain section, where projected stumpage prices rise at an average rate of 3.8 percent per year.

In all regions, the surge in residential construction in the first decade produces the higher rates of increase, ranging from 3.1 percent in the North Central region to 9.1 percent in the Rocky Mountain region. The rates of increase decline during the 1990's but move up between 2000 and 2010 as a result of a small rise in homebuilding (see table 3.3). After 2010, the rates generally decline. The Douglas-fir subregion is an exception to this pattern. During the 1990's stumpage prices decline in response to a reduction in regional demand for timber.

As a result of the different rates of increase, the current relationships in stumpage prices among regions change materially over the projection period as shown in the following tabulation.

Figure 8.1

Softwood Roundwood Harvests, 1952-76, with Projections of Demands on and Supplies from Domestic Forests to 2030



Region	*Projected softwoods stumpage prices—1967 dollars per thousand board feet*		
	Scribner log scale		
	1990	*2000*	*2030*
Northeast	31.00	35.00	53.00
North Central	29.00	34.00	53.00
Southeast	85.00	104.00	195.00
South Central	85.00	104.00	194.00
Rocky Mountains	53.00	57.00	116.00
Pacific Northwest:			
Douglas-fir subregion	104.00	87.00	163.00
Ponderosa pine subregion	59.00	65.00	119.00
Pacific Southwest	71.00	79.00	136.00

[2] The softwood projection model used in estimating these equilibrium prices consists of sets of supply and demand relations. Demand equations were developed for lumber and plywood in each of seven demand regions and supply equations for nine supply regions, including Canada. The costs of transporting wood products from supply to demand regions were explicitly considered. Estimates of pulpwood, miscellaneous products, and fuelwood production in each supply region were derived from projections of consumption and trade in these products presented in earlier sections. The demand for stumpage in each supply region represents the demand for all roundwood material derived from the production of all types of products (lumber, plywood, pulpwood, etc.). Supplies of stumpage consist of all public harvests set by Federal and State agency policies and private supplies that are responsive to both stumpage price and inventory volumes available. Inventory volumes by ownership and region are projected over time using the TRAS model. In each year of the simulation, the several supply and demand equations interact in the several markets to determine market clearing prices and volumes consumed and produced for all products and stumpage in all regions.

Parameters in the model (such as demand and supply elasticities) were estimated by statistical means using historical data for the period 1950–76. Thus, responses projected by the model are consistent with past market behavior and reflect probable outcomes given that behavior. In addition, the model uses deflated prices so that price changes reported will be in addition to general inflationary increases.

The hardwood model, used in estimating regional equilibrium hardwood stumpage prices discussed below, is similar to the softwood model, although it contains a less elaborate treatment of demand and does not include regional detail in the West.

[3] The regional analysis includes assumptions about increasing processing efficiency but, like the base level price projections, does not include any assumptions about increases in radial growth rates which would presumably result from intensified management induced by the equilibrium increases in stumpage prices as a result. The prices projected in the last decades of the projection are biased upward as higher stumpage prices should include management intensification that after 2000 would lead to higher levels of timber supplies and lower prices. This "reiterative" or "loop" problem is addressed further in Chapter 9, where the price and resource effects of intensified management are discussed (see pages 253 to 255).

[4] All prices are measured in 1967 dollars, thus the effects of general price inflation or deflation are excluded. The increases shown, therefore, measure change relative to the general price level and to most competing materials.

Table 8.2—*Trend level[1] softwood stumpage price[2] indexes in the contiguous States, by region, 1952, 1962, 1970, and 1976, with projections of equilibrium price[3] indexes to 2030*

(Index of price per thousand board feet, International ¼-inch log rule—1967=100)

Region	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
Northeast	100.0	100.0	100.0	100.0	166.1	185.1	213.6	245.3	279.5
North Central	100.0	100.0	100.0	100.0	154.0	180.9	207.3	238.9	279.0
Southeast	57.8	83.3	111.6	138.9	229.6	280.0	358.0	434.6	526.8
South Central	57.8	83.3	111.6	138.9	230.6	281.6	358.5	434.3	524.7
Rocky Mountain	58.0	83.5	111.5	138.7	473.0	514.4	704.1	859.7	1,045.0
Pacific Northwest[4]									
Douglas-fir subregion (Western Washington and western Oregon)	43.8	75.9	118.0	164.2	275.0	228.2	287.4	355.8	430.3
Ponderosa Pine subregion (Eastern Washington and eastern Oregon)	80.6	93.1	104.4	113.8	300.5	330.6	425.1	500.8	603.1
Pacific Southwest[5]	52.9	80.9	113.6	146.5	300.8	334.7	416.3	490.2	579.9

[1]Prices on a least squares regression line fitted to time series price data for the years 1950–76.
[2]Prices are measured in constant (1967) dollars and are net of inflation or deflation. They measure price changes relative to the general price level and most competing materials.
[3]The prices which would result from stumpage prices rising enough to maintain an equilibrium between projected timber demands and supplies. These indexes were computed from stumpage price projections and the trend 1967 price. While convenient for displaying changes within regions and the relative rates of change between regions, these indexes should not be used to compare prices among regions. For example, the projected index levels imply that the Rocky Mountain region has the highest stumpage prices relative to other regions when in fact it is among those regions with the lowest stumpage prices.
[4]Excludes Alaska.
[5]Excludes Hawaii.

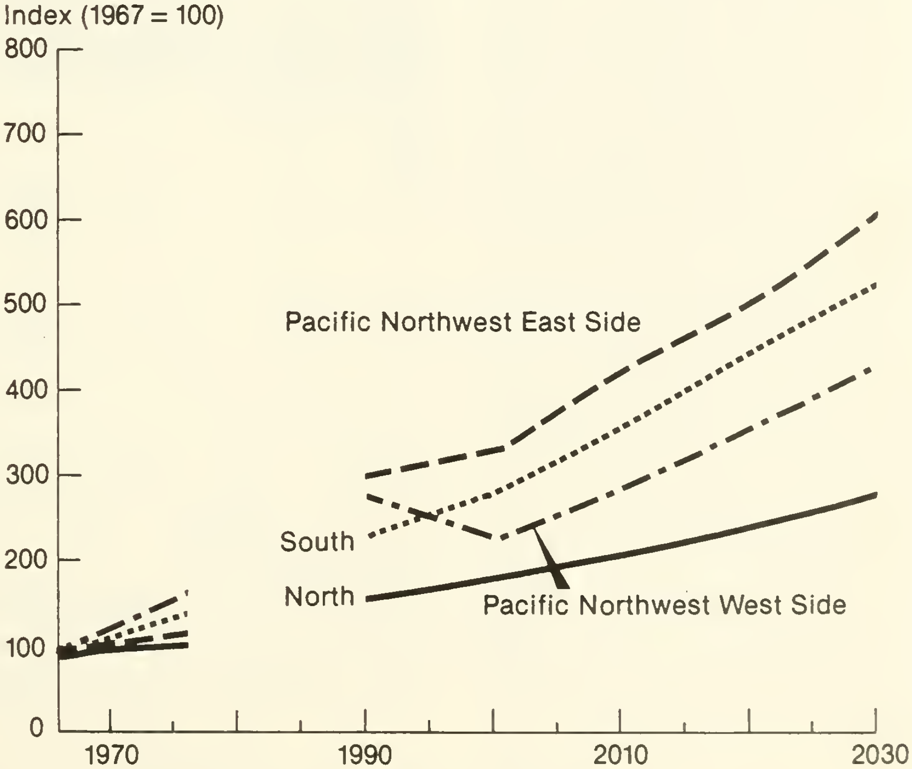
For example, softwood stumpage prices in the South increase relative to other regions, including the Douglas-fir region and by 2030 are highest of all regions.

The regional variations in the rates of increase are caused by a number of complex forces. In general, however, they reflect the amount of competition for the available timber, differences in stumpage characteristics, and variations in regional logging, manufacturing, and transportation costs. They are also influenced by the trend level of stumpage prices in 1976. When the 1976 prices are low (as in the Rocky Mountain section), the rates of increase in prices will be much larger, even with the same dollar increase, than in regions in which the base year (1976) prices are high (as in the Douglas-fir region). Most of the decline in the rates of price increase over the projection decades is due to this same relationship, i.e., as prices move up, the rates of change drop, although the change in dollar terms may remain the same.

Trends in Equilibrium Softwood Timber Demands and Supplies. There are significant changes in demand and supplies associated with the projected increases in softwood stumpage prices. Roundwood demands are reduced below the amounts indicated by the base level projections. At the same time, sup-

Figure 8.2

Softwood Stumpage Price* Indexes by Region, 1967-76, with Projections to 2030



*Per thousand board feet, International ¼-inch log rule

plies rise above the base level projections as private timber owners respond to higher prices. Consequently, as illustrated in figure 8.1, the equilibrium level falls between the base level demand and supply projections.

There are also significant changes in the level of imports. The cubic volume of imports (roundwood equivalent) with equilibrium prices is below the projected volumes with base level prices. Imports measured in board feet (sawtimber equivalent) under equilibrium prices rise above the levels projected under base level prices in the early decades of the projection period, but then decline fairly rapidly. As indicated in the following discussion, these changes reflect differing trends in the imports of softwood lumber, paper and board, and wood pulp. These trends, in turn, reflect complex shifts in stumpage and production costs in the major timber producing regions in the United States and Canada.

Regional projections of softwood timber demands and supplies under base level and equilibrium prices are shown in table 8.3. The demand and supply projections associated with the higher equilibrium prices are significantly different from the base level projections. Roundwood demand is reduced in all regions below the base level projections. At the same time, supply rises above the base level projections reflecting private timber owners' response to higher prices. As in the case of the national projections, the equilibrium levels fall between the base level projections of demands and supplies.

The regional distribution of both the base level and equilibrium projections of softwood timber supplies are about the same. Thus, the shifts in the relative importance of the various regions as sources of timber under the equilibrium projections are much the same as those for the base level projections described in some detail in the preceding chapter. For example, the shares of the total softwood roundwood supplies originating in the eastern regions, Rocky Mountain section, and the ponderosa pine subregion increase over the projection period. The share originating in the Douglas-fir subregion, on the other hand, drops from nearly a quarter of the total in 1976 to 15 percent in 2030. There is also a small decline in the share coming from the Pacific Southwest.

Nearly all of the increase in supplies under equilibrium price levels is on the farmer and other private and forest industry ownerships. Suppies on the National Forests and on the other public ownerships in all regions, except the Rocky Mountains, are set by the planned harvest ceilings (see discussion, page 151) and are not affected by the equilibrium price increases. Thus, the base and equilibrium level projections are essentially the same in the early projection decades. In the Rocky Mountain section, however, the planned harvest ceilings were not reached in the early decades as rapid increases in the private cut retard National Forest harvest levels. After 2010, this situation changes and National Forest harvests increase, rapidly rising slightly above the base levels toward the end of the projection period.

Effects of Equilibrium Levels of Softwood Timber Harvests on Net Annual Growth and Inventories. The higher softwood timber harvests under equilibrium prices accelerate the trends in net annual growth and inventories and especially in the South (table 8.4). By the end of the projection period, net annual growth of softwood growing stock in that section, given equilibrium levels of timber product removals, would be only 75 percent of the base level projections. Softwood roundwood inventories drop even more rapidly and by 2030, amount to only a little over half of the base level projections (fig. 8.3). Inventories on the Pacific Coast are also below the base level projections.

The reduction in softwood net annual growth and inventories is concentrated on the farmer and other private and forest industry ownerships (table 8.5).[5] By 2030, inventories on both of these ownerships are reduced by more than a third. The reduction in the inventories in the farmer and other private ownerships is concentrated in the South.

As described in various places in preceding sections, a primary objective of this study is to describe developing problems that would have major impacts on the timber sector and, in a broader sense, on the economy and the society. The projected trends in softwood timber inventories, which would result from equilibrium levels of harvest, fall in this category. Undoubtedly, as prices rise, and concern about the prospective decline in inventories develops, action will be taken to increase net annual growth supplies and keep

[5] This reflects the fact that projected equilibrium supply levels on the public ownership are set by planned harvest ceilings and, with the exception of the National Forests in the Rocky Mountains, are not affected by the rising equilibrium prices—see discussion above.

Figure 8.3

Softwood Roundwood Inventories in the South, 1952-76, with Projections to 2030

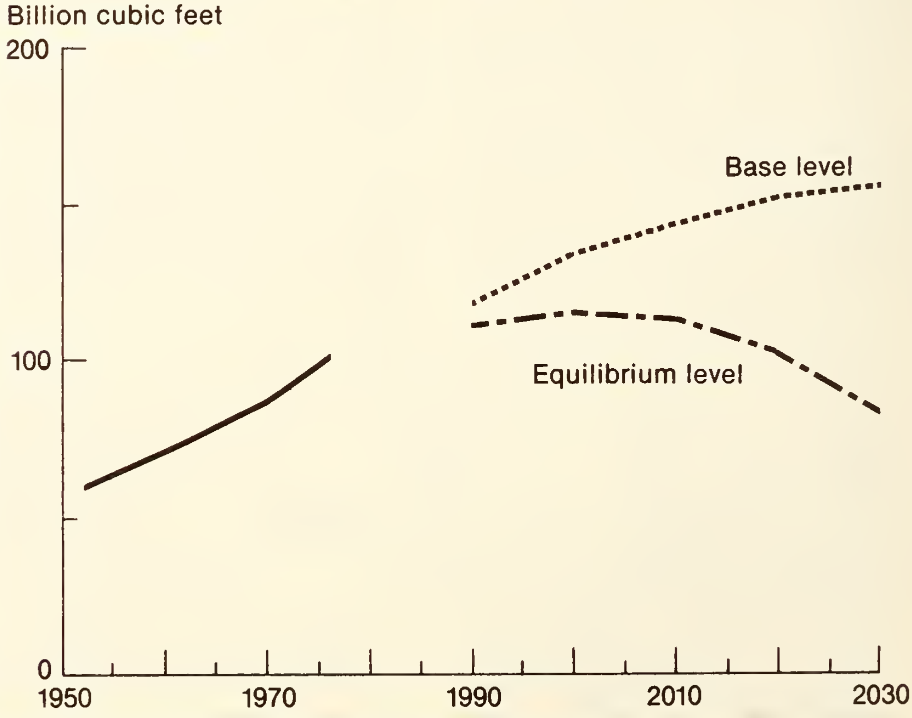


Table 8.3—*Softwood timber demand on and supply from forests in the contiguous States, by region, 1952, 1962, 1970, and 1976, with projections (medium level demand) under alternative price assumptions to 2030*

(Billion cubic feet)

					Projections									
					Base level price trends[2]					Equilibrium price trends[3]				
Item	1952[1]	1962[1]	1970[1]	1976[1]	1990	2000	2010	2020	2030	1990	2000	2010	2020	2030
Northeast														
Regional demand[4]	0.47	0.39	0.41	0.46	0.57	0.66	0.71	0.74	0.77	0.54	0.60	0.65	0.70	0.75
Regional supply[5]	.47	.39	.41	.46	.53	.57	.61	.64	.67	.54	.60	.65	.70	.75
Supply-demand balance	0	0	0	0	−.04	−.09	−.10	−.10	−.10	0	0	0	0	0
North Central[6]														
Regional demand[4]	.21	.18	.15	.16	.35	.44	.49	.54	.57	.33	.39	.45	.51	.55
Regional supply[5]	.21	.18	.15	.16	.29	.35	.38	.41	.43	.33	.39	.45	.51	.55
Supply-demand balance	0	0	0	0	−.06	−.09	−.11	−.13	−.14	0	0	0	0	0
Southeast														
Regional demand[4]	1.65	1.46	1.63	1.83	2.82	3.30	3.62	3.73	3.85	2.63	2.92	3.22	3.38	3.54
Regional supply[5]	1.65	1.46	1.63	1.83	2.27	2.54	2.71	2.82	2.90	2.63	2.92	3.22	3.38	3.54
Supply-demand balance	0	0	0	0	−.55	−.76	−.91	−.91	−.95	0	0	0	0	0
South Central														
Regional demand[4]	1.27	1.08	1.99	2.35	3.30	3.83	4.23	4.40	4.52	2.97	3.23	3.55	3.71	3.83
Regional supply[5]	1.27	1.08	1.99	2.35	2.64	2.88	3.05	3.21	3.31	2.97	3.23	3.55	3.71	3.83
Supply-demand balance	0	0	0	0	−.66	−.95	−1.18	−1.19	−1.21	0	0	0	0	0
Rocky Mountain														
Regional demand[4]	.42	.61	.83	.76	1.14	1.25	1.37	1.44	1.54	1.03	1.08	1.17	1.25	1.36
Regional supply[5]	.42	.61	.83	.76	.91	1.01	1.08	1.12	1.13	1.03	1.08	1.17	1.25	1.36
Supply-demand balance	0	0	0	0	−.23	−.24	−.29	−.32	−.41	0	0	0	0	0
Pacific Northwest[7]														
Douglas-fir subregion (Western Washington and western Oregon)														
Regional demand[4]	2.09	2.19	2.23	2.37	2.58	2.37	2.40	2.33	2.26	2.44	2.20	2.20	2.15	2.10
Regional supply[5]	2.09	2.19	2.23	2.37	2.26	2.20	2.14	2.08	2.05	2.44	2.20	2.20	2.15	2.10
Supply-demand balance	0	0	0	0	−.32	−.17	−.26	−.25	−.21	0	0	0	0	0
Ponderosa Pine subregion (Eastern Washington and eastern Oregon)														
Regional demand[4]	.33	.41	.53	.59	.65	.74	.83	.87	.92	.57	.61	.67	.71	.76
Regional supply[5]	.33	.41	.53	.59	.54	.59	.63	.68	.72	.57	.61	.67	.71	.76
Supply-demand balance	0	0	0	0	−.11	−.15	−.20	−.19	−.20	0	0	0	0	0
Pacific Southwest[8]														
Regional demand[4]	.76	.81	.81	.85	1.00	1.02	1.05	1.05	1.06	.89	.87	.89	.89	.91
Regional supply[5]	.76	.81	.81	.85	.77	.77	.80	.84	.88	.89	.87	.89	.89	.91
Supply-demand balance	0	0	0	0	−.23	−.25	−.25	−.21	−.18	0	0	0	0	0
Contiguous States														
Demand[4]	7.20	7.13	8.58	9.39	12.41	13.61	14.70	15.10	15.49	11.40	11.90	12.80	13.30	13.80
Supply[5]	7.20	7.13	8.58	9.39	10.21	10.91	11.40	11.80	12.09	11.40	11.90	12.80	13.30	13.80
Supply-demand balance	0	0	0	0	−2.20	−2.70	−3.30	−3.30	−3.40	0	0	0	0	0

Data are estimates of actual consumption or harvests and differ somewhat from the "trend" estimates shown in the preceding section on timber supplies.

[2]Projections show timber demand on and supply from domestic forests assuming that the price trends in the base period used in making projections (roughly from the late 1950's through the mid-1970's) continue through the projection period.

[3]Projections show timber demand on and supply from domestic forests assuming that prices rise enough to maintain an equilibrium between projected demand and supply.

[4]Demand for products converted to a roundwood equivalent basis. The projections include adjustments for increased product yield per unit of roundwood input which are expected to result from improvements in utilization.

[5]The base level projections show the volume of timber available for harvest from regional forests if recent trends in the forces determining supply, such as commercial timberland area, management and prices continue through the projection period.

[6]Includes the Great Plains States—Kansas, Nebraska, North Dakota, and eastern South Dakota.

[7]Excludes Alaska.

[8]Excludes Hawaii.

Note: Data may not add to totals because of rounding. Projections: U.S. Department of Agriculture, Forest Service.

Sources: Data for 1952, 1962, 1970, and 1976 based on information published by the U.S. Departments of Agriculture and Commerce.

Table 8.4—*Softwood roundwood supplies, net annual growth, and growing stock inventory in the contiguous States, by section, 1952, 1962, 1970, and 1976, with base and equilibrium level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
North									
Base level									
Roundwood supplies	596	501	549	636	820	921	993	1,050	1,094
Net annual growth	993	1,234	1,362	1,600	1,722	1,660	1,554	1,452	1,374
Inventory	27,629	34,332	39,661	44,574	56,996	65,069	71,425	76,111	79,676
Equilibrium level									
Roundwood supplies	596	501	549	636	710	1,033	1,137	1,232	1,322
Net annual growth	993	1,234	1,362	1,600	1,712	1,667	1,581	1,502	1,450
Inventory	27,629	34,332	39,661	44,574	55,835	62,946	68,259	71,828	74,080
South									
Base level									
Roundwood supplies	3,049	2,709	3,531	4,234	4,887	5,392	5,774	6,053	6,229
Net annual growth	3,625	4,680	5,605	6,158	6,720	6,800	6,732	6,625	6,488
Inventory	58,245	71,553	84,896	97,136	119,833	134,699	145,385	152,465	156,120
Equilibrium level									
Roundwood supplies	3,049	2,709	3,531	4,234	5,688	6,238	6,848	7,242	7,514
Net annual growth	3,625	4,680	5,605	6,158	6,499	6,444	6,192	5,737	4,857
Inventory	58,245	71,553	84,896	97,136	111,681	116,055	113,612	103,564	84,298
Rocky Mountain									
Base level									
Roundwood supplies	496	684	814	773	906	1,008	1,076	1,125	1,143
Net annual growth	1,097	1,253	1,449	1,589	1,629	1,607	1,557	1,493	1,427
Inventory	87,457	93,104	94,413	94,935	101,425	106,171	109,903	112,500	114,324
Equilibrium level									
Roundwood supplies	496	684	814	773	1,043	1,091	1,180	1,276	1,387
Net annual growth	1,097	1,253	1,449	1,589	1,751	1,828	1,878	1,899	1,902
Inventory	87,457	93,104	94,413	94,935	102,222	107,926	113,774	119,131	123,564
Pacific Coast									
Base level									
Roundwood supplies	3,381	3,360	3,688	3,759	3,570	3,545	3,567	3,607	3,662
Net annual growth	1,917	2,319	2,760	2,872	3,127	3,340	3,540	3,684	3,762
Inventory	207,580	198,359	188,012	178,510	160,175	155,578	154,315	154,613	156,042
Equilibrium level									
Roundwood supplies	3,381	3,360	3,688	3,759	3,935	3,713	3,799	3,835	3,853
Net annual growth	1,917	2,319	2,760	2,872	3,119	3,323	3,499	3,595	3,600
Inventory	207,580	198,359	188,012	178,510	157,665	150,690	147,454	145,147	143,461
Contiguous States									
Base level									
Roundwood supplies	7,522	7,254	8,582	9,402	10,182	10,866	11,410	11,835	12,128
Net annual growth	7,673	9,526	11,218	12,261	13,199	13,408	13,383	13,383	13,051
Inventory	383,347	399,783	409,417	417,590	438,429	461,518	481,029	495,689	506,162
Equilibrium level									
Roundwood supplies	7,522	7,254	8,582	9,402	11,576	12,075	12,964	13,585	14,076
Net annual growth	7,673	9,526	11,218	12,261	13,081	13,262	131,150	12,733	11,809
Inventory	383,347	399,783	409,417	417,590	427,403	437,617	443,099	439,670	425,403

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 8.5—*Softwood roundwood supplies, net annual growth, and growing stock inventory in the contiguous States, by ownership, 1952, 1962, 1970, and 1976, with base and equilibrium level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Base level									
Roundwood supplies	950	1,569	1,818	1,784	2,015	2,247	2,404	2,530	2,609
Net annual growth	1,653	1,983	2,341	2,442	2,679	2,824	2,919	2,959	2,942
Inventory	165,500	175,376	174,150	172,284	167,119	170,824	174,988	178,593	181,653
Equilibrium level									
Roundwood supplies	950	1,569	1,818	1,784	1,981	2,179	2,359	2,537	2,712
Net annual growth	1,653	1,983	2,341	2,442	2,778	3,018	3,207	3,328	3,374
Inventory	165,500	175,376	174,150	172,284	168,332	174,438	181,970	189,438	196,367
Other public									
Base level									
Roundwood supplies	415	559	695	800	855	924	966	1,001	1,034
Net annual growth	677	891	1,024	1,076	1,155	1,199	1,217	1,220	1,218
Inventory	47,338	46,892	47,770	48,635	50,702	53,269	55,902	58,401	60,736
Equilibrium level									
Roundwood supplies	415	559	695	800	855	924	966	1,001	1,034
Net annual growth	677	891	1,024	1,076	1,155	1,199	1,217	1,220	1,218
Inventory	47,338	46,892	47,770	48,635	50,702	53,269	55,902	58,409	60,736
Forest industry									
Base level									
Roundwood supplies	2,796	2,289	2,896	3,417	3,208	3,167	3,181	3,218	3,262
Net annual growth	1,872	2,326	2,611	2,866	3,084	3,200	3,249	3,267	3,270
Inventory	77,280	75,895	74,887	74,382	72,119	74,079	76,359	78,430	80,027
Equilibrium level									
Roundwood supplies	2,796	2,289	2,896	3,417	3,364	3,282	3,523	3,671	3,771
Net annual growth	1,872	2,326	2,611	2,866	2,990	3,033	2,967	2,761	2,328
Inventory	77,280	75,895	74,887	74,382	68,829	68,353	66,079	60,389	50,376
Farmer and other private									
Base level									
Roundwood supplies	3,361	2,836	3,174	3,401	4,044	4,528	4,859	5,085	5,222
Net annual growth	3,470	4,326	5,243	5,877	6,280	6,186	5,999	5,806	5,621
Inventory	93,228	101,622	112,611	122,291	148,490	163,345	173,781	180,265	183,746
Equilibrium level									
Roundwood supplies	3,361	2,836	3,174	3,401	5,344	5,689	6,116	6,375	6,559
Net annual growth	3,470	4,326	5,243	5,877	6,159	6,011	5,761	5,420	4,890
Inventory	93,228	101,622	112,611	122,291	139,539	141,559	139,148	131,442	118,122
Contiguous States									
Base level									
Roundwood supplies	7,522	7,253	8,583	9,403	10,181	10,866	11,409	11,834	12,127
Net annual growth	7,673	9,526	11,218	12,261	13,199	13,179	13,383	13,252	13,051
Inventory	383,346	399,785	409,418	418,516	438,429	461,517	481,029	495,689	506,162
Equilibrium level									
Roundwood supplies	7,522	7,253	8,583	9,403	11,575	12,074	12,964	13,584	14,075
Net annual growth	7,673	9,526	11,218	12,261	13,082	13,261	13,152	12,735	11,810
Inventory	383,346	399,785	409,418	418,516	422,402	437,618	443,099	439,671	425,401

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

inventories above the levels shown by the equilibrium projections in tables 8.4 and 8.5. Nonetheless, unless the expansion in management programs is large, the recent and prospective growth in the timber processing industries in the South will be a temporary thing lasting only a few decades and followed by a contraction in capacity similar to that underway on the Pacific Coast.

In the Rocky Mountain region, the higher equilibrium levels of harvests lead to higher net growth rates and consequently higher inventories. The reason for this is the harvest shift from National Forest to private lands. This shift concentrates growth on younger stands on private lands while allowing inventories to build on National Forests.

Projected Hardwood Timber Demand-Supply Relationships

Projections of hardwood supply and demand under both base and equilibrium price levels are shown in table 8.6. In general, the base level projections for hardwoods—both roundwood and sawtimber—show a more favorable supply outlook than for softwoods.

It appears that the projected supplies of hardwood timber will be large enough to meet projected demands over the next two or three decades. Beyond these decades, projected demands begin to rise above the projected supplies. As this happens, hardwood stumpage prices, along with those for most hardwood timber products, will begin to rise.

In the case of hardwood roundwood, projected base level demands on domestic forests—after allowances for imports and exports—rise from 2.9 billion cubic feet in 1976 to 6.0 billion in 2000 and 9.4 billion in 2030 (table 8.6). Projected supplies rise from 2.9 billion cubic feet in 1976 to 6.0 billion in 2000 and 8.9 billion in 2030. Thus, the supplies of hardwood roundwood potentially available under the base level assumptions in terms of cubic feet exceed or equal projected base level demands through 2000, but fall increasingly short thereafter (fig. 8.4). Demands on domestic forests for hardwood sawtimber rise from about 10.6 billion board feet in 1976 to 20.0 billion in 2000, and 29.7 billion in 2030. The projected demands are consistently somewhat above the base level projections of supplies throughout the projection period.

Trends in Equilibrium Hardwood Stumpage Prices. On the basis of these data, it appears that supplies will be adequate in the next two or three decades to meet demands for most hardwood products including those in large volume markets such as the pulp industry. As a result, there may not be much increase in average hardwood stumpage prices in the years immediately ahead (table 8.7, fig. 8.5). Beyond the next few decades, however, base level demands begin to rise above base level supplies. As this occurs, stumpage prices move upward, especially in the South Central region, where competition for the available supplies is likely to be the most intense.

This outlook would be changed if there is an increase in demand for fuelwood much above the projected levels. Such an increase would likely fall primarily on the hardwood resource in the North. A relatively small increase could alter the demand-supply balances in the northern regions and result in rising prices in the years immediately ahead. A large increase in demand would, of course, greatly intensify the competition for hardwood timber and cause rapid increases in prices.

The preceding outlook applies to the bulk of the hardwood resource. The demand-supply-price outlook for larger sized hardwood sawtimber of preferred species, such as select white and red oak, walnut, and black cherry is quite different from that for the smaller-sized lower-quality material that composes most of the hardwood inventories. Removals of the higher quality sawtimber of most preferred species have been close to or above net annual growth in recent decades, and continuing and large increases in stumpage prices have apparently reflected this situation. These trends in prices seem likely to continue.

Trends in Equilibrium Hardwood Timber Demands and Supplies. The equilibrium projections of hardwood timber demands and supplies are not much different from the base level projections

Figure 8.4

Hardwood Roundwood Harvests, 1952-76, with Projections of Demands on and Supplies from Domestic Forests to 2030

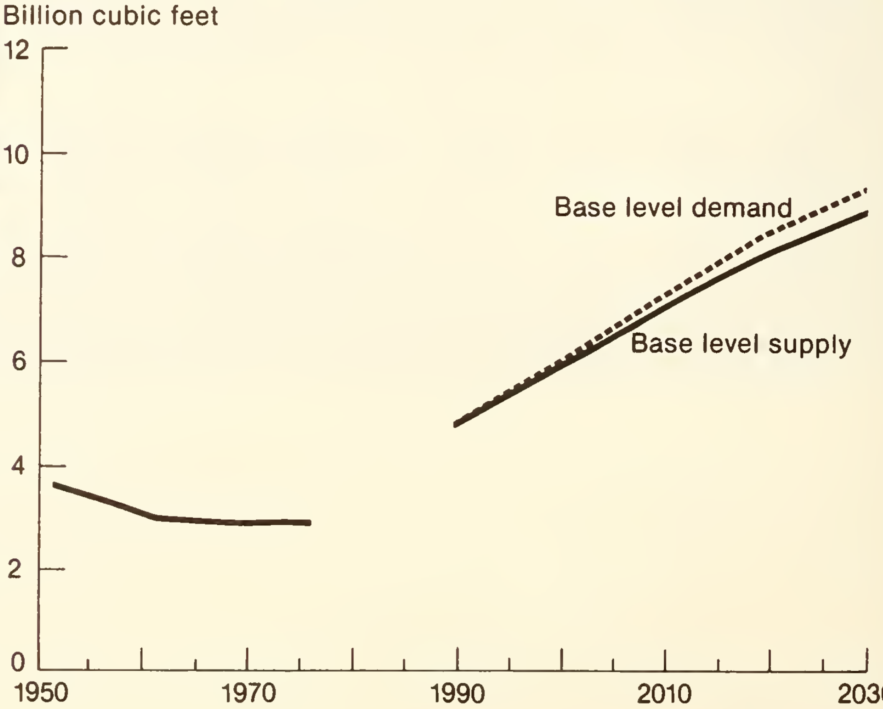


Table 8.6—*Hardwood timber demand, exports, imports, and demand on and supply from domestic forests in the United States, 1952, 1962, 1970, and 1976, with projections (medium level demand) under alternative price assumptions to 2030*

(Billion cubic feet)

Item	1952[1]	1962[1]	1970[1]	1976[1]	Projections: Base level price trends[2] 1990	2000	2010	2020	2030	Projections: Equilibrium price trends[3] 1990	2000	2010	2020	2030
Total demand[4]	3.5	3.1	3.0	3.0	5.3	6.4	7.5	8.7	9.6	5.3	6.4	7.3	8.5	9.2
Exports[5]	([6])	.1	.2	.2	.2	.2	.4	.4	.4	.2	.2	.4	.4	.4
Imports	.1	.2	.3	.3	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
Demand on domestic forests[7]	3.6	3.0	2.9	2.9	4.9	6.0	7.3	8.5	9.4	4.9	6.0	7.1	8.3	9.0
Supply from domestic forests[8]	3.6	3.0	2.9	2.9	4.9	6.0	7.1	8.1	8.9	4.9	6.0	7.1	8.3	9.0
Supply-demand balance	0	0	0	0	0	0	−.2	−.4	−.5	0	0	0	0	0
(Billion board feet, International ¼-inch log rule)														
Total demand[4]	11.7	11.5	12.4	11.4	17.8	21.2	24.7	28.2	30.9	15.9	19.6	23.4	27.6	30.2
Exports[5]	.2	.4	.5	.6	.7	1.0	1.2	1.2	1.3	.7	1.0	1.2	1.2	1.3
Imports	.3	1.0	1.4	1.5	2.0	2.2	2.5	2.6	2.5	2.0	2.2	2.5	2.6	2.5
Demand on domestic forests[7]	11.5	10.9	11.5	10.6	16.5	20.0	23.4	26.8	29.7	14.6	18.4	22.1	26.2	29.0
Supply from domestic forests[8]	11.5	10.9	11.5	10.6	14.7	18.5	21.9	25.4	27.5	14.6	18.4	22.1	26.2	29.0
Supply-demand balance	0	0	0	0	−1.8	−1.5	−1.5	−1.4	−2.2	0	0	0	0	0

[1]Data are estimates of actual consumption or harvests and differ somewhat from the "trend" estimates shown in the preceding section on timber supplies.
[2]Projections show timber demand, imports and supply from domestic forests assuming that the price trends in the base period used in making projections (roughly from the late 1950's through the mid 1970's) continue through the projection period.
[3]Projections show timber demand, imports and supply from domestic forests assuming that prices rise enough to maintain an equilibrium between projected demand and supply.
[4]Total demand for products converted to a roundwood equivalent basis. The projections include adjustments for increased product yield per unit of roundwood input which are expected to result from improvements in utilization.
[5]Logs and those products manufactured directly from roundwood including pulp and pulp products.
[6]Less than 50 million cubic feet.
[7]Total U.S. demand plus exports minus imports.
[8]The base level projections show the volume of timber available for harvest from domestic forests if recent trends in the forces determining supply, such as commercial timberland area, management and prices continue through the projection period.

Note: Data may not add to totals because of rounding.

Sources: Data for 1952, 1962, 1970, and 1976 based on information published by the U.S. Departments of Agriculture and Commerce.

Projections: U.S. Department of Agriculture, Forest Service.

Table 8.7—*Trend level[1] hardwood stumpage price[2] indexes in the contiguous States, by region, 1952, 1962, 1970, and 1976, with projections of equilibrium price[3] indexes to 2030*

(Index of price per thousand board feet, International ¼-inch log rule—1967=100)

Region	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
Northeast	100.0	100.0	100.0	100.0	104.1	92.1	93.0	98.8	105.1
North Central	100.0	100.0	100.0	100.0	99.7	93.1	97.9	109.8	123.3
Southeast	100.0	100.0	100.0	100.0	113.9	99.1	101.7	112.9	126.4
South Central	100.0	100.0	100.0	100.0	136.3	123.6	137.3	166.9	203.0

[1]Prices on a least squares regression line fitted to time series price data for the years 1962–70.
[2]Prices are measured in constant (1967) dollars and are net of inflation or deflation. They measure price changes relative to the general price level and most competing materials.
[3]The prices which would result from stumpage prices rising enough to maintain an equilibrium between projected timber demands and supplies.

through 2030 (table 8.8). It was assumed that the small increases in equilibrium stumpage prices, would not affect imports or exports of hardwood timber products in a significant way.

Regional projections of hardwood timber demands and supplies are also quite similar under both base level and equilibrium prices. In the North, the equilibrium roundwood projections and prices are below the base level projections in the early decades of the projection period. This situation results from massive increases in inventories which augment supplies at a faster rate than the projected increases in hardwood roundwood demands. By 2020, however, growth in pulpwood demand reverses the situation and results in rising equilibrium prices.

In the South Central region, base level demands rise above supplies by 1990, largely because of increased pulp production. As a result, there is continuing, and beyond 2000, strong upward pressure in hardwood stumpage prices.

Effects of Equilibrium Levels of Hardwood Timber Harvests on Net Annual Growth and Inventories. The small increase in hardwood timber product removals under the equilibrium levels of harvest has little impact on net annual hardwood timber growth and inventories (tables 8.9 and 8.10). The largest difference is in the South Central region—the equilibrium levels of inventory there in 2030 are 3 percent under the base level projections.

In appraising the outlook for changes in net annual growth and inventories of hardwoods, the closeness of the base level demand-supply projections should be kept in mind. Any substantial increase in the demand for hardwood timber for fuelwood, or any other product, could alter the projections of hardwood net annual growth and inventories shown in tables 8.9 and 8.10. For geographic areas such as a State, this could take place rapidly and cause price increases beyond those indicated by the analyses.

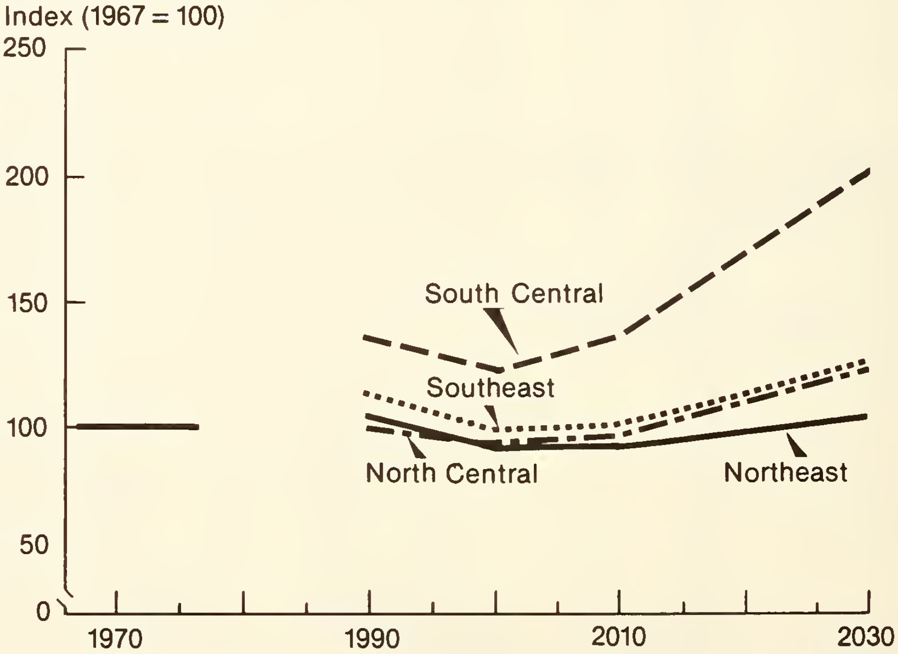
Effects of Rising Stumpage Prices on Timber Products

Increases in stumpage prices, such as those shown in tables 8.2 and to a lesser extent in table 8.7, raise production costs and affect timber product (lumber, plywood, paper and board) prices, demand, trade, and domestic production (demand on domestic forests). They are also the driving force behind inter-regional shifts in mill capacity since they are the only components of costs whose relative levels among regions change significantly over time. Other production costs such as labor, materials, and capital change, but the relationships among regions and products remain much the same. Increases in these costs explain part of the rise in product prices prior to 2000.

Effects of Rising Stumpage Prices on Lumber Prices. As a result of the projected increases in softwood stumpage

Figure 8.5

Hardwood Stumpage Price* Indexes by Region, 1967-76, with Projections to 2030



*Per thousand board feet, International ¼-inch log rule

Table 8.8—*Hardwood timber demand on and supply from forests in the contiguous States, by region, 1952, 1962, 1970, and 1976, with projections (medium level demand) under alternative price assumptions to 2030*

(Billion cubic feet)

Item	1952[1]	1962[1]	1970[1]	1976[1]	Projections: Base level price trends[2] 1990	2000	2010	2020	2030	Projections: Equilibrium price trends[3] 1990	2000	2010	2020	2030
Northeast														
Regional demand[4]	0.55	0.55	0.54	0.52	0.73	0.88	1.03	1.17	1.30	0.72	0.85	0.98	1.13	1.22
Regional supply[5]	.55	.55	.54	.52	.73	.88	1.01	1.14	1.24	.72	.85	.98	1.13	1.22
Supply-demand balance	0	0	0	0	0	0	−.02	−.03	−.06	0	0	0	0	0
North Central[6]														
Regional demand[4]	.98	.80	.75	.81	1.29	1.53	1.85	2.17	2.40	1.28	1.52	1.79	2.09	2.28
Regional supply[5]	.98	.80	.75	.81	1.29	1.53	1.80	2.06	2.28	1.28	1.52	1.79	2.09	2.28
Supply-demand balance	0	0	0	0	0	0	−.05	−.11	−.12	0	0	0	0	0
Southeast														
Regional demand[4]	.77	.62	.63	.64	1.13	1.42	1.78	2.09	2.35	1.14	1.44	1.74	2.06	2.27
Regional supply[5]	.77	.62	.63	.64	1.13	1.42	1.73	2.00	2.24	1.14	1.44	1.74	2.06	2.27
Supply-demand balance	0	0	0	0	0	0	−.05	−.09	−.11	0	0	0	0	0
South Central														
Regional demand[4]	1.27	.96	.89	.84	1.65	2.07	2.54	2.97	3.25	1.66	2.09	2.49	2.92	3.13
Regional supply[5]	1.27	.96	.89	.84	1.62	2.02	2.41	2.75	3.00	1.66	2.09	2.49	2.92	3.13
Supply-demand balance	0	0	0	0	−.03	−.05	−.13	−.22	−.25	0	0	0	0	0
West														
Regional demand[4]	.03	.07	.09	.09	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Regional supply[5]	.03	.07	.09	.09	.13	.15	.15	.15	.14	.10	.10	.10	.10	.10
Supply-demand balance	0	0	0	0	.03	.05	.05	.05	.04	0	0	0	0	0
Contiguous States														
Demand[4]	3.60	3.00	2.90	2.90	4.90	6.00	7.30	8.50	9.40	4.90	6.00	7.10	8.30	9.00
Supply[5]	3.60	3.00	2.90	2.90	4.90	6.00	7.10	8.10	8.90	4.90	6.00	7.10	8.30	9.00
Supply-demand balance	0	0	0	0	0	0	−.20	−.40	−.50	0	0	0	0	0

[1]Data are estimates of actual consumption or harvests and differ somewhat from the "trend" estimates shown in the preceding section on timber supplies.

[2]Projections show timber demand on, and supply from domestic forests assuming that the price trends in the base period used in making the projections (roughly from the late 1950's through the mid-1970's) continue through the projection period.

[3]Projections show timber demand on, and supply from domestic forests assuming that prices rise enough to maintain an equilibrium between projected demand and supply.

[4]Demand for products converted to a roundwood equivalent basis. The projections include adjustments for increased product yield per unit of roundwood input which are expected to result from improvements in utilization.

[5]The base level projections show the volume of timber available for harvest from regional forests if recent trends in the forces determining supply, such as commercial timberland area, management and prices continue through the projection period.

[6]Includes the Great Plains States—Kansas, Nebraska, North Dakota, and eastern South Dakota.

Note: Data may not add to totals because of rounding.

Sources: Data for 1952, 1962, 1970, and 1976 based on information published by the U.S. Departments of Agriculture and Commerce.

Projections: U.S. Department of Agriculture, Forest Service.

Table 8.9—*Hardwood roundwood supplies, net annual growth, and growing stock inventory in the contiguous States, by section, 1952, 1962, 1970, and 1976, with base and equilibrium level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
North									
Base level									
Roundwood supplies	1,381	1,329	1,464	1,502	2,024	2,422	2,805	3,217	3,510
Net annual growth	2,992	3,507	3,926	4,192	4,305	3,963	3,623	3,386	3,282
Inventory	83,645	103,070	116,201	128,571	161,994	180,021	191,074	195,797	197,201
Equilibrium level									
Roundwood supplies	1,381	1,329	1,464	1,502	2,021	2,395	2,783	3,234	3,572
Net annual growth	2,992	3,507	3,926	4,192	4,305	3,962	3,610	3,381	3,277
Inventory	83,645	103,070	116,201	128,571	162,182	180,357	191,623	196,294	197,282
South									
Base level									
Roundwood supplies	1,935	1,648	1,833	1,692	2,732	3,466	4,117	4,773	5,213
Net annual growth	2,822	3,133	3,971	4,547	4,724	4,563	4,362	4,226	4,120
Inventory	78,238	84,485	91,923	104,873	130,525	142,820	146,839	144,123	135,550
Equilibrium level									
Roundwood supplies	1,935	1,648	1,833	1,692	2,785	3,516	4,185	4,895	5,387
Net annual growth	2,822	3,133	3,971	4,547	4,724	4,564	4,359	4,215	4,088
Inventory	78,238	84,485	91,923	104,873	130,560	142,233	145,819	142,076	131,990
Rocky Mountain									
Base level									
Roundwood supplies	11	14	12	4	5	5	5	6	5
Net annual growth	57	66	84	100	98	96	94	91	87
Inventory	3,978	4,502	4,877	4,879	6,128	6,519	6,865	7,147	7,338
Equilibrium level									
Roundwood supplies	11	14	12	4	5	5	5	6	5
Net annual growth	57	66	84	100	98	96	94	91	87
Inventory	3,978	4,502	4,877	4,879	6,128	6,519	6,865	7,147	7,338
Pacific Coast									
Base level									
Roundwood supplies	35	61	82	97	126	134	137	136	133
Net annual growth	357	443	539	541	305	225	175	147	129
Inventory	12,191	14,509	17,242	16,481	16,696	17,225	17,310	17,147	16,926
Equilibrium level									
Roundwood supplies	35	61	82	97	126	134	137	136	133
Net annual growth	357	443	539	541	305	225	175	147	129
Inventory	12,191	14,509	17,242	16,481	16,696	17,225	17,310	17,147	16,926
Contiguous States									
Base level									
Roundwood supplies	3,362	3,052	3,391	3,295	4,886	6,027	7,065	8,132	8,861
Net annual growth	6,229	7,149	8,519	9,380	9,431	8,846	8,253	7,850	7,618
Inventory	178,053	206,566	230,243	254,804	315,252	346,494	361,995	364,121	356,922
Equilibrium level									
Roundwood supplies	3,362	3,052	3,391	3,295	4,937	6,050	7,110	8,271	9,097
Net annual growth	6,229	7,149	8,519	9,380	9,430	8,847	8,238	7,834	7,581
Inventory	178,053	206,566	230,243	254,804	315,474	346,242	361,524	362,571	353,443

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

prices and other costs, softwood lumber prices rise at an average annual rate of 1.7 percent over the projection period (table 8.11). The rate of increase is much more rapid in the 1976-90 period, averaging about 3.6 percent per year. This largely reflects the big surge in demand, and the associated upward pressure on stumpage prices, resulting from the projected growth in new residential construction.

The projected rate of increase in equilibrium softwood lumber prices is consistent with the long historical trend in lumber prices (fig. 8.6). Since 1800, the price of lumber measured in constant dollars has been rising at an average rate of 1.7 percent per year. In addition the historical increases have not been evenly spread. Typically, there have been periods of a decade or two when prices showed little change or a decline. This has been followed by periods, such as the 1976-90 period, when prices rose rapidly.

Equilibrium hardwood lumber prices rise at an average annual rate of about 1.0 percent per year. The demand for hardwood lumber is not greatly affected by residential construction and the rise in prices is much more evenly spread over the projection period.

Table 8.10—*Hardwood roundwood supplies, net annual growth, and growing stock inventory in the contiguous States, by ownership, 1952, 1962, 1970, and 1976, with base and equilibrium level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Base level									
Roundwood supplies	100	97	123	101	132	163	194	221	246
Net annual growth	396	508	569	651	631	560	484	433	397
Inventory	13,004	16,503	18,329	20,514	26,858	31,057	34,177	36,383	37,844
Equilibrium level									
Roundwood supplies	100	97	123	101	132	163	194	221	246
Net annual growth	396	508	569	651	631	560	484	433	397
Inventory	13,004	16,503	18,329	20,514	26,858	31,057	34,177	36,383	37,844
Other public									
Base level									
Roundwood supplies	122	115	156	177	232	271	307	339	367
Net annual growth	543	684	796	879	726	589	496	444	413
Inventory	14,498	18,658	21,783	24,410	29,932	33,858	36,285	37,820	38,736
Equilibrium level									
Roundwood supplies	122	115	156	177	232	271	307	339	367
Net annual growth	543	684	796	879	726	589	496	444	413
Inventory	14,498	18,658	21,783	24,410	29,932	33,858	36,285	37,820	38,736
Forest industry									
Base level									
Roundwood supplies	421	434	488	473	770	974	1,148	1,331	1,458
Net annual growth	688	830	1,058	1,207	1,254	1,237	1,204	1,187	1,176
Inventory	20,025	24,770	28,494	31,884	40,660	44,999	46,820	46,918	45,483
Equilibrium level									
Roundwood supplies	421	434	488	473	778	981	1,161	1,352	1,490
Net annual growth	688	830	1,058	1,207	1,254	1,237	1,205	1,187	1,174
Inventory	20,025	24,770	28,494	31,884	40,675	44,929	46,806	46,626	44,925
Farmer and other private									
Base level									
Roundwood supplies	2,718	2,405	2,624	2,543	3,752	4,618	5,416	6,240	6,789
Net annual growth	4,602	5,128	6,096	6,643	6,820	6,460	6,070	5,786	5,631
Inventory	130,526	146,635	161,638	177,997	217,802	236,580	244,704	243,000	234,858
Equilibrium level									
Roundwood supplies	2,718	2,405	2,624	2,543	3,793	4,634	5,452	6,358	6,995
Net annual growth	4,602	5,128	6,096	6,643	6,820	6,459	6,053	5,769	5,597
Inventory	130,526	146,635	161,638	177,997	218,009	236,398	244,256	241,743	231,938
Contiguous States									
Base level									
Roundwood supplies	3,362	3,052	3,391	3,295	4,886	6,027	7,065	8,132	8,861
Net annual growth	6,229	7,149	8,519	9,380	9,431	8,846	8,253	7,850	7,618
Inventory	178,053	206,566	230,243	254,804	315,252	346,494	361,995	364,121	356,922
Equilibrium level									
Roundwood supplies	3,362	3,052	3,391	3,295	4,935	6,049	7,114	8,270	9,098
Net annual growth	6,229	7,149	8,519	9,380	9,431	8,845	8,238	7,833	7,581
Inventory	178,053	206,566	230,243	254,805	315,474	346,242	361,523	362,572	353,444

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Effects of Rising Lumber Prices on Demand, Trade, and Production. Increases in lumber prices of the magnitudes shown by the equilibrium analysis substantially reduce the demand for lumber (table 8.12, fig. 8.7). By 2030, for example, the demand for softwood lumber under equilibrium prices will be 42 billion board feet, a little over 9 billion board feet below the projected levels under base level prices. In this same period, the projected increases in equilibrium hardwood lumber prices would reduce hardwood lumber demand from 16.0 to 13.9 billion board feet.

Per capita demand under both base and equilibrium prices shows a rise in the early decades in response to the jump in residential construction, then drops through the rest of the projection years. However, under equilibrium prices, per capita demand for lumber (softwoods and hardwoods) in 2030 would be 186 board feet, some 7 percent below the 1976 level of 198 board feet.

Softwood lumber imports under equilibrium prices show an initial large increase, then a slow rise to a peak of 13.9 billion board feet in 2010. In this period, imports supply most of the projected increase in demand for softwood lumber. This is the result of

Table 8.11—*Trend level[1] price[2] indexes for selected timber products in the United States, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with projections under alternative price assumptions to 2030*

(Index of price per unit—1967=100)

Product and unit and species group	1952	1962	1970	1976	Projections									
					Base level prices[3]					Equilibrium prices[4]				
					1990	2000	2010	2020	2030	1990	2000	2010	2020	2030
Lumber (thousand board feet)														
Softwoods	99.2	108.1	115.7	121.5	133.4	142.6	152.4	162.9	174.1	199.8	225.2	249.5	271.4	296.2
Hardwoods	92.9	98.9	104.0	108.2	118.9	127.4	136.4	146.1	156.5	127.9	135.2	150.5	168.9	186.6
Plywood (thousand square feet, ⅜-inch basis)														
Softwoods	108.2	108.2	108.2	108.2	108.2	108.2	108.2	108.2	108.2	193.7	200.7	212.7	220.9	231.3
Hardwoods	87.4	87.4	87.4	87.4	87.4	87.4	87.4	87.4	87.4	78.6	82.7	86.9	91.4	96.1
Paper and board (tons)	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	105.1	110.5	116.1	122.1	128.3

[1]Prices on a least squares regression line fitted to time series price data for the years 1950–76.
[2]Prices are measured in constant (1967) dollars and are net of inflation or deflation. They measure price changes relative to the general price level and most competing materials.
[3]For a description of base level price projections, see footnote 3 of Chapter 7, page 150.
[4]The prices which would result from stumpage prices rising enough to maintain an equilibrium between projected timber demands and supplies.

Table 8.12—*Lumber consumption, exports, imports, and production in the United States, 1952, 1962, 1970, and 1976, with projections (medium growth in population and economic activity) under alternative price assumptions to 2030*

Year	Consumption				Exports			Imports			Production		
	Total	Per capita	Softwoods	Hardwoods	Total	Softwoods[1]	Hardwoods	Total	Softwoods[1]	Hardwoods	Total	Softwoods	Hardwoods
	Billion board feet	*Board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*
1952	39.2	249	31.9	7.3	0.7	0.6	0.2	2.5	2.3	0.2	37.5	30.2	7.2
1962	37.3	200	30.8	6.5	.8	.6	.1	4.9	4.6	.3	33.2	26.8	6.4
1970	39.5	193	32.2	7.3	1.2	1.1	.1	6.1	5.8	.3	34.7	27.5	7.1
1976	42.7	198	36.2	6.5	1.8	1.6	.2	8.2	8.0	.3	36.3	29.9	6.4
						Projections—base level price trends							
Year	Total demand				Exports			Imports			Demand on U.S. mills		
1990	57.9	238	47.8	10.1	2.1	1.9	.2	13.9	13.5	.4	46.2	36.2	9.9
2000	59.9	230	48.6	11.3	2.1	1.8	.3	13.6	13.0	.6	48.4	37.4	11.0
2010	65.3	237	52.4	12.9	2.1	1.7	.4	13.8	13.0	.8	53.6	41.1	12.5
2020	66.6	230	52.0	14.6	2.1	1.6	.5	13.4	12.5	.9	55.3	41.1	14.2
2030	67.3	224	51.3	16.0	2.1	1.6	.5	13.0	12.0	1.0	56.4	40.9	15.5
						Projections—equilibrium price trends							
1990	51.8	213	42.2	9.6	2.1	1.9	.2	13.1	12.7	.4	40.8	31.4	9.4
2000	52.1	200	41.3	10.8	2.1	1.8	.3	14.3	13.7	.6	39.9	29.4	10.5
2010	55.8	203	43.8	12.0	2.1	1.7	.4	14.7	13.9	.8	43.2	31.6	11.6
2020	56.0	193	43.0	13.0	2.1	1.6	.5	13.1	12.2	.9	45.0	32.4	12.6
2030	55.9	186	42.0	13.9	2.1	1.6	.5	11.0	10.0	1.0	47.0	33.6	13.4

[1]Includes small volumes of mixed species (not classified as softwoods or hardwoods).

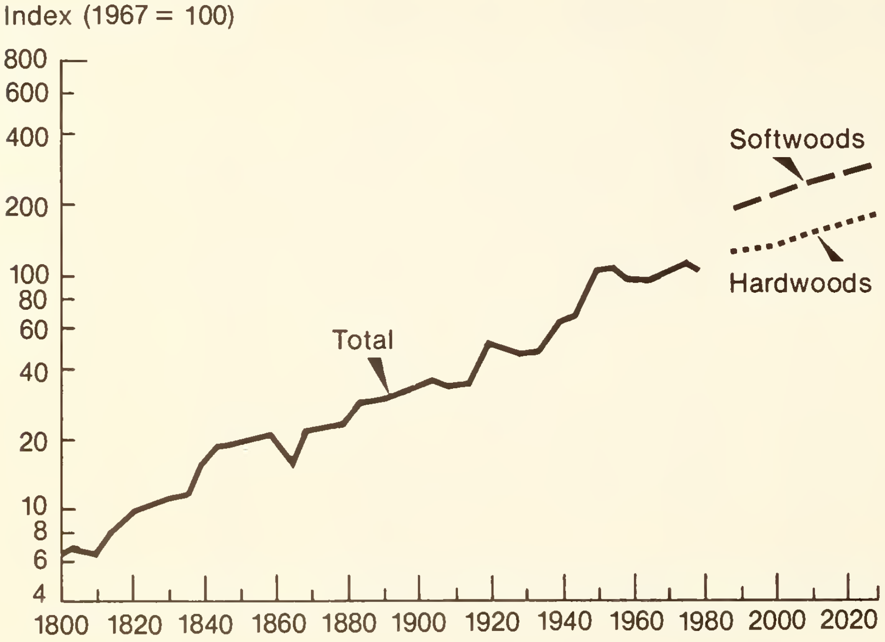
Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Lumber production and mill stocks.* Curr. Ind. Reps. Ser. MA-24T. Annual., *U.S. exports: schedule B commodity by country.* FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.

Projections: U.S. Department of Agriculture, Forest Service.

Figure 8.6

Relative Producer Price Indexes for Lumber, 1800-1979, with Projections* to 2030



*Equilibrium price trends

slower projected growth in Canadian lumber production costs (stumpage, logging, and manufacturing costs) relative to such costs in the major lumber-producing regions in the United States.[6] By 2000, Canadian imports have displaced lumber from southern sources in northeastern markets and lumber from the Rockies in the north central markets. U.S. producers retain dominance in the West and South, but even in these markets, Canadian imports will have made important inroads. After 2010, Canadian costs are projected to rise faster than U.S. costs, as producers are forced to obtain stumpage of declining quality at increasing distances from mills, and from sites with increasingly adverse logging conditions. The Canadian market share and the volume of imports decline as a result.

[6] In the equilibrium projections, expansion and contraction of softwood lumber production and imports were determined by profit margins (as measured the difference between prices and total production costs) realized in each producing region relative to historical levels. Production cost disadvantages faced by domestic regions stem both from rising stumpage and nonwood costs. The increases in production costs (fueled by rapidly increasing stumpage prices) are particularly important in the Pacific Coast regions during the first decade of the projection period.

The importance of changing stumpage costs is also illustrated by the equilibrium projections of regional softwood production (demand on domestic mills), shown in table 8.13. These projections portray an industry in continual transition, with production shifting among regions largely in response to changes in relative stumpage costs. There is, for example, an initial shift in production from the regions in the Pacific Coast to those in the South. But after 1990, production begins to drop in the South as intensifying competitiion for timber, particularly for pulpwood, drives up stumpage costs. After 2000, production begins to rise in the Pacific Coast regions, and this continues through 2030. Softwood lumber production in the northern regions and the Rocky Mountains rises through the projection period, and substantially so in the Rocky Mountains.

It was assumed that the projected increases in equilibrium hardwood lumber prices have no signficant effect on hardwood lumber exports. Thus the reduction in demand for lumber associated with the rise in equilibrium prices is reflected in a lower demand on domestic forests. Domestic production in 2030 under equilibrium prices is some 2 billion board feet, 14 percent under the base level projections (table 8.12).

The regional projections of hardwood lumber production shift in response to changing cost conditions, though substantially less markedly than for softwood lumber (table 8.13). Hardwood lumber production is projected to increase in all but the western regions. Output in the southern regions rises more rapidly than in the northern regions, however, and by 2030, the share of southern production is about 10 percent higher than in 1976. The bulk of the adjustments in regional shares takes place before 2000.

Regional variations in production costs and supply elasticities underlie this pattern of interregional shifts in market shares. As discussed in a preceding section, stumpage prices for hardwood sawtimber are essentially stable in the northern regions, while they rise modestly in the South Central and Southeast. Total production costs increase less rapidly in the South than in the North, however, so that as demand for lumber expands, greater volumes are drawn from the southern regions.

Effects of Rising Stumpage Prices on Plywood Prices. The equilibrium projections of softwood plywood prices more than double by 2030, rising at an average annual rate of 1.4 percent per year (table 8.11). As for softwood lumber, most of the increase in equilibrium prices takes place by 1990, and for the same reason, the big surge in demand associated with the jump in residential construction in the 1980's.

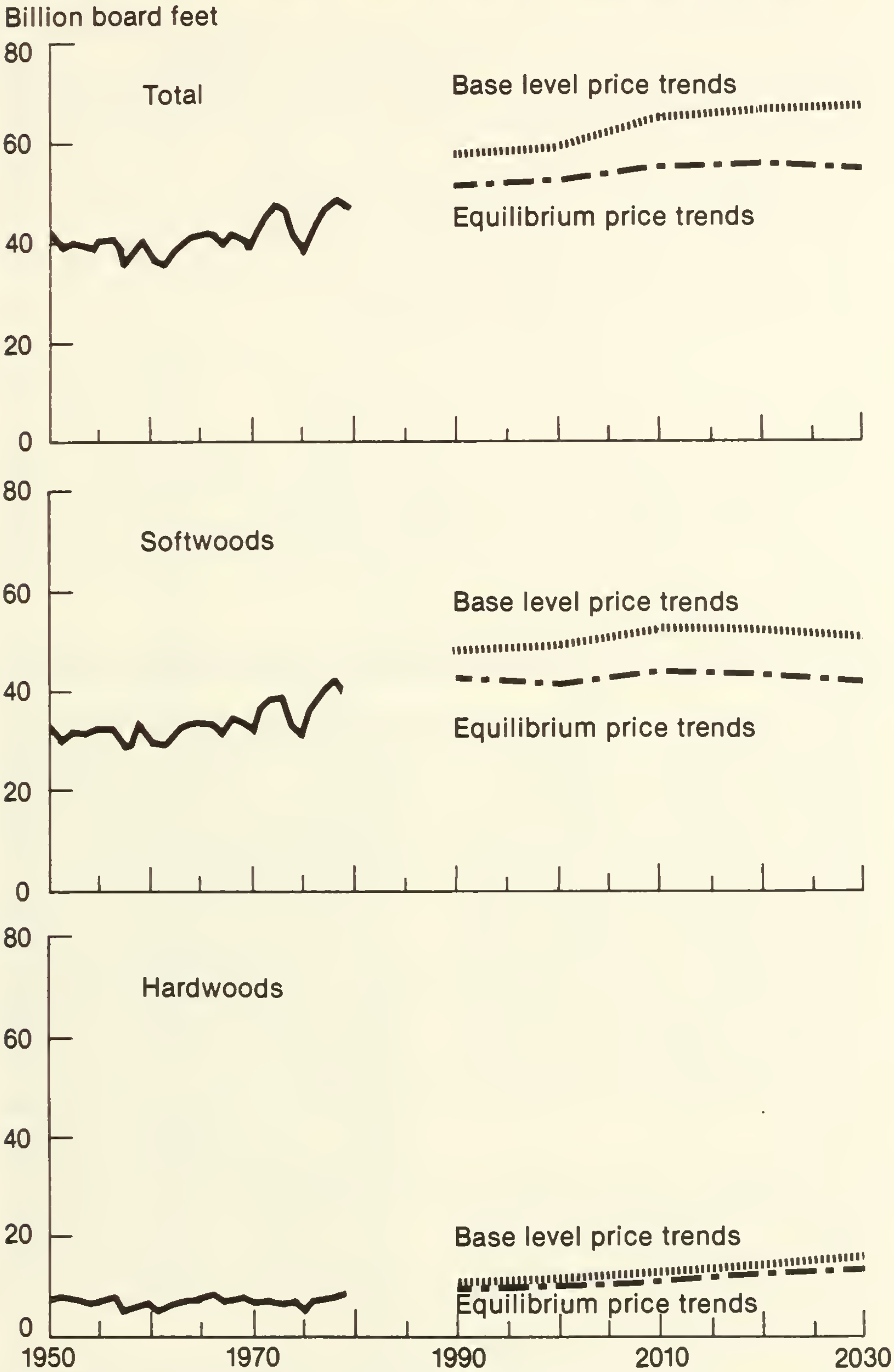
In contrast to softwood plywood, there is little change in the equilibrium hardwood plywood prices. The index in 2030 is only 10 percent above the 1976 level.

As with lumber, the projected changes in equilibrium plywood prices largely reflect changes in stumpage costs. For example, the softwood stumpage cost component rises nearly four times faster than processing costs in the Douglas-fir subregion and nearly five times faster in the South Central region.

Effects of Rising Plywood Prices on Demand, Trade, and Production. The equilibrium projections of demand for softwood plywood are substantially below the base level projections, and especially so in the latter part of the projection period (table 8.14). Demand under equilibrium prices increases by about 5 billion square feet in the 1980's, but after 1990, it stabilizes at the 22-23 billion square foot level. As a result of this stabilization, the difference between the equilibrium and base level projections of demand steadily widens and by 2030 amounts to about 5 billion square

Figure 8.7

Lumber Consumption, 1950-79, with Projections to 2030



feet. The stabilization in equilibrium levels of demand reflects, in part, substitution of structural grades of particleboard for softwood plywood in construction and some manufacturing uses.

Equilibrium softwood plywood prices are not expected to significantly affect imports or exports. Thus, the changes in softwood plywood demand associated with these prices are directly reflected in changes in demand on domestic forests or production.

In the response to regional changes in equilibrium softwood stumpage prices, there are substantial regional shifts in softwood plywood production (table 8.15). Production declines in the Douglas-fir subregion, falling from 8.9 billion square feet in 1976 to 5.5 billion in 2030. Over the same period, production in the southern regions moves up from 6.8 billion square feet to 13.1 billion. There are also increases in the ponderosa pine subregion and the Rocky Mountains, although the production in these areas remains fairly small compared to the South.

The projected increases in equilibrium hardwood plywood prices have no significant effects on hardwood demand, trade or domestic production.

Effects of Rising Stumpage Prices on Paper and Board Prices. The impacts of rising equilibrium stumpage prices on the prices of the major timber products depends in large part on the importance of stumpage costs relative to the selling price of the product. In the case of lumber, where stumpage costs represent a large portion of the mill selling price, the equilibrium increases in stumpage prices have a substantial impact on the product prices. On the other hand, in the case of paper and board, stumpage costs represent only a small percentage of the selling price of the product, and the projected increases in equilibrium stumpage prices have relatively little effect. For example, in contrast to the projected 144-percent increase in the equilibrium prices of softwood lumber between 1976 and 2030, equilibrium prices of paper and board rise by only about a third (table 8.11).

This outlook is different from historical experience in the industry. Wood costs to the pulp and paper industry measured in constant dollars have not changed significantly since the late 1800's. As wood costs began to rise for a certain kind of wood, or in a region, the industry shifted to other kinds of wood or other regions for its supplies. For example, as the costs of fir and spruce wood began to rise in the North, the industry shifted to the pines in the South and, at a later time, to the residues of sawmills and plywood plants, and later still to hardwoods.

There is a potential for further increasing use of hardwoods, logging residues, tree tops, limbs, and other similar material that is not currently utilized. However, the potential now seems fairly limited in relation to the projected growth in demand for pulpwood shown in Chapter 3. Thus, the industry faces the prospect of competing to an increasing degree with other wood-using industries for the available wood supplies. This will surely mean rising wood costs with the associated impacts on product prices such as those described above.

Rising costs of fuels, chemicals, and other materials may cause increases in paper and board prices beyond those

Table 8.13—*Lumber production in the contiguous States, by softwoods and hardwoods and region, 1952, 1962, 1970, and 1976, with projections (equilibrium price trends) to 2030*

(Billion board feet, lumber tally)

Species group and region	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Northeast	1.3	0.8	0.6	0.8	0.9	1.0	1.0	1.1	1.2
North Central	.4	.3	.3	.4	.4	.4	.5	.5	.5
Southeast	5.2	2.7	3.1	3.0	4.3	1.0	3.9	3.3	3.1
South Central	3.6	3.2	4.2	4.4	6.4	5.7	5.5	4.8	4.0
Rocky Mountains	2.5	3.6	4.2	4.5	5.4	5.7	6.3	7.0	7.8
Pacific Northwest[1]									
Douglas-fir subregion (Western Washington and western Oregon)	10.3	8.6	7.4	8.3	5.5	4.1	5.2	6.0	6.6
Ponderosa Pine subregion (Eastern Washington and eastern Oregon)	2.3	2.4	2.3	2.7	2.9	3.1	3.5	3.8	4.2
Pacific Southwest[2]	4.6	5.0	5.1	6.0	5.6	5.5	5.7	5.9	6.2
HARDWOODS									
Northeast	.9	1.0	1.4	1.5	1.7	1.9	2.2	2.4	2.7
North Central	2.4	1.2	1.5	1.9	2.1	2.3	2.5	2.8	3.0
Southeast	1.6	1.5	1.7	1.3	2.3	2.6	2.8	3.1	3.3
South Central	2.3	2.6	2.5	1.7	3.1	3.5	3.9	4.1	4.1
West	([3])	.1	.1	.2	.2	.2	.2	.2	.2

[1]Excludes Alaska.
[2]Excludes Hawaii.
[3]Less than 50 million board feet.

associated with rising stumpage prices. However, the pulp and paper industry has a consistent historical record of cost-saving technical improvements at all levels of processing. In the equilibrium projections, it was assumed that these improvements would continue, and at a sufficiently rapid rate, to offset the bulk of any future cost increases.

It will obviously require very large amounts of capital to build the mills to meet the projections of demand for paper and board presented in Chapter 3. Increases in paper and board prices beyond those shown in table 8.11 may be necessary to attract this capital.

Effects of Rising Paper and Board Prices on Demand, Trade, and Production. As a result of the relatively small size of the increase and inelastic demand for most grades of papers and board, the projected rise in the equilibrium prices of paper and board (table 8.11) has very little effect on the levels of demand, trade, and production—the equilibrium levels are close to the base level projections through 2030 (table 8.16). There is also little impact on the associated levels of demand, trade, and production of wood pulp.

There are, however, some significant changes in regional pulp production levels, in the use of pulp chips produced from plant byproducts, and in the use of hardwoods. The regional equilibrium projections show most of the growth in wood pulp production and pulpwood consumption taking place in the eastern sections. Production increases in the northern regions are, in effect, a continuation of the trends of recent decades (table 8.17). Production expands by about three times in the South by 2030 but the rate of growth is slower than that of recent years. As a result of these trends, the shares of the wood pulp produced in the eastern regions rise by about 6 percent by 2030. Offsetting this, and despite some expansion in total production, the shares originating in the Pacific Coast regions decline.

In 1975, roundwood accounted for about 66 percent of the pulpwood consumed, and chips, produced from slabs, edgings, veneer cores, and other similar byproducts of solid wood manufacturing plants, accounted for about 34 percent. By 2030, the roundwood share is projected to rise to 81 percent and the chip share to fall to 19 percent. The decline in chip use represents a reversal of the upward trend of recent decades and results from growth of pulp production at a faster rate than the projected supply of chips from solid wood manufacturing plants.

The Douglas-fir subregion faces the largest adjustments. As a result of sharply declining lumber production in this area, chip availability falls, forcing pulp producers to substitute roundwood. Pulpwood input is projected to switch from predominantly chips (80 percent in 1975) to predominantly roundwood before the turn of the century. With the exception of the ponderosa pine subregion and the Pacific Southwest, similar but substantially less marked trends are projected in the other regions.

An increasing share of the pulpwood used will be hardwoods. While there are substantial differences among the regions, hardwoods as a percentage of total pulpwood inputs rise from 26 percent in 1975 to 38 percent in 2030 (table 8.18). This is a continuation of the historical trend in hardwood use. However, it is based on the relatively favorable hardwood timber supply and price situation described above. Any significant change in this outlook, such as a big increase in the use of hardwoods for fuel, could greatly alter the projected trends in hardwood use in pulping.

Effects of Rising Stumpage Prices on Other Timber Products. The projected increases in equilibrium stumpage prices, shown in tables 8.2 and 8.7, would have widely varying impacts on the prices and demand for other timber products such as posts, poles, piling, mine timbers, and cooperage logs. As for lumber, plywood, and paper and board, the impacts would depend on the price elasticity of demand for the various products and the importance of stumpage costs relative to product selling prices.

Table 8.14—*Plywood consumption, exports, imports, and production in the United States, 1952, 1962, 1970, and 1976, with projections (medium growth in population and economic activity) under alternative price assumptions to 2030*

(3/8-inch basis)

Year	Consumption				Exports			Imports			Production[1]		
	Total	Per capita	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods[2]	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods
	Billion square feet	*Square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*	*Billion square feet*
1952	4.4	28	3.2	1.3	(3)	(3)	(3)	0.1	(3)	0.1	4.4	3.2	1.2
1962	11.7	63	9.3	2.4	(3)	(3)	(3)	.9	(3)	.9	10.8	9.3	1.5
1970	17.8	87	14.0	3.8	0.2	0.1	0.1	2.0	(3)	2.0	15.9	14.1	1.8
1976	20.6	96	17.2	3.4	.8	.7	.1	2.4	(3)	2.4	19.0	17.9	1.1
Projections—base level price trends													
Year	Total demand				Exports			Imports			Demand on U.S. mills		
1990	29.0	119	23.7	5.3	.9	.9	(3)	3.5	(3)	3.5	26.4	24.6	1.8
2000	30.0	115	24.3	5.8	.8	.8	(3)	3.7	(3)	3.7	27.2	25.1	2.1
2010	32.8	119	26.6	6.2	.7	.7	(3)	4.0	(3)	4.0	29.5	27.3	2.2
2020	33.8	117	27.2	6.6	.6	.6	(3)	4.0	(3)	4.0	30.4	27.8	2.6
2030	34.1	114	27.3	6.8	.6	.6	(3)	3.8	(3)	3.8	30.9	27.9	3.0
Projections—equilibrium price trends													
1990	27.1	111	21.8	5.3	.9	.9	(3)	3.5	(3)	3.5	24.5	22.7	1.8
2000	27.8	107	22.0	5.8	.8	.8	(3)	3.7	(3)	3.7	24.9	22.8	2.1
2010	29.2	106	23.0	6.2	.7	.7	(3)	4.0	(3)	4.0	25.9	23.7	2.2
2020	29.6	102	23.0	6.6	.6	.6	(3)	4.0	(3)	4.0	26.2	23.6	2.6
2030	28.9	96	22.1	6.8	.6	.6	(3)	3.8	(3)	3.8	25.7	22.7	3.0

[1]Includes production from both domestic and imported species.
[2]Includes mixed species (not classified as softwoods or hardwoods).
[3]Less than 50 million square feet.

Note: Data may not add to totals because of rounding.

Sources: U.S Department of Commerce, Bureau of the Census *Softwood plywood*. Curr. Ind. Reps. Ser. MA-24H. Annual., *Hardwood plywood*. Curr. Ind. Reps. Ser. MA-24F. Annual., *U.S. exports: schedule B commodity by country*. FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin*. FT 246. Annual.

Projections: U.S. Department of Agriculture, Forest Service.

Table 8.15—*Softwood plywood production in the contiguous States, by region, 1952, 1962, 1970, and 1976, with projections (equilibrium price trends) to 2030*

(Billion square feet, 3/8-inch basis)

Region	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
Northeast	(1)	(1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
North Central	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Southeast	(1)	(1)	.9	1.7	2.9	3.3	3.8	4.2	4.5
South Central	(1)	(1)	2.4	5.1	7.6	7.8	8.4	8.7	8.6
Rocky Mountains	(1)	0.2	.9	1.2	1.4	1.5	1.5	1.5	1.5
Pacific Northwest[2]									
Douglas-fir subregion (Western Washington and western Oregon)	2.7	7.9	8.5	8.9	8.5	7.7	7.4	6.5	5.5
Ponderosa Pine subregion (Eastern Washington and eastern Oregon)	(1)	.2	.8	.9	1.4	1.7	1.9	2.1	2.1
Pacific Southwest[3]	.3	1.2	.8	.6	.9	.7	.6	.5	.4

[1]Less than 50 million square feet.
[2]Excludes Alaska.
[3]Excludes Hawaii.

Table 8.16—*Paper and board consumption, exports, imports, and production in the United States, 1952, 1962, 1970, and 1976, with projections (medium growth in population and economic activity) under alternative price assumptions to 2030*

(Million tons)

Year	Consumption	Exports	Imports	Production
1952	29.1	0.5	5.2	24.4
1962	42.4	1.0	5.8	37.5
1970	58.1	2.7	7.2	53.5
1976	64.0	3.2	7.2	59.9

Projections—base level price trends

Year	Total demand	Exports	Imports	Demand on U.S. mills
1990	100.3	4.5	9.3	95.5
2000	123.4	4.9	10.3	118.0
2010	147.8	5.3	11.2	141.9
2020	171.8	5.7	12.0	165.5
2030	194.6	6.0	12.7	187.9

Projections—equilibrium price trends

Year	Total demand	Exports	Imports	Demand on U.S. mills
1990	99.5	4.5	9.4	94.6
2000	121.7	4.9	10.5	116.1
2010	145.3	5.3	11.4	139.2
2020	167.7	5.7	12.3	161.1
2030	189.1	6.0	13.1	182.0

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Curr. Ind. Reps. Ser. M26A. Annual., *U.S. exports: schedule B commodity by country.* FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.; American Paper Institute. *Statistics of paper and paperboard.* Annual. New York.

Projections: U.S. Department of Agriculture, Forest Service.

In general, however, rising equilibrium stumpage prices would reduce demand below the base level projections and raise product prices.

The General Timber Demand-Supply Price Outlook. In view of the many uncertainties involved in projecting both demands and supplies, the above description of the equilibrium timber demand-supply-price situation must be regarded as a general approximation that would only be realized under the assumed conditions underlying these specific projections.

Many factors could lead to price paths different from those indicated by this analysis. For example, the projections of demand could vary from those shown if the growth in population, economic activity, and income is different from that assumed. As indicated above, unforeseen changes in the demand for some products, such as fuelwood, also could greatly alter the future price outlook.

Timber supplies could be lower, and prices higher, than projected as a result of factors such as greater diversion of commercial timberlands to other uses, more constraints on timber management because of environmental considerations, nontimber objectives of forest owners, or extraordinary mortality losses. Also, more intensive management than that assumed could result in higher supply level than shown by the projections and result in lower stumpage and product prices.

Despite all uncertainties, it does seem reasonably clear that the Nation is faced with the prospect of continuing and substantial increases in relative stumpage prices for most species and sizes of timber and for most timber products. The increases are likely to be largest for softwood sawtimber, the higher quality hardwood timber of preferred species, and the products—chiefly lumber and plywood—made from this timber. This outlook is consistent with the trends that have prevailed during most of the twentieth century. It reflects

Table 8.17—*Woodpulp production and roundwood and plant byproduct[1] consumption in the woodpulp industry in the contiguous States, by region, 1952, 1962, 1970, and 1975, with projections (equilibrium price trends) to 2030*

Item	1952	1962	1970	1975	Projections 1990	2000	2010	2020	2030
PULP PRODUCTION (Thousand tons)									
Northeast	2,700	2,990	4,040	3,720	5,947	7,005	8,134	9,168	10,460
North Central	1,840	2,750	3,990	3,860	7,009	8,946	11,074	13,416	15,440
Southeast	5,140	8,700	13,800	14,780	23,930	29,202	34,398	39,354	43,820
South Central	3,840	6,220	13,530	13,220	23,435	27,852	32,340	37,006	41,330
Rocky Mountains	110	280	800	850	1,699	2,194	2,646	3,242	3,860
Pacific Northwest[2]									
Douglas-fir subregion[3]	2,640	3,640	6,120	5,380	7,080	7,090	7,056	7,155	7,100
Ponderosa Pine subregion[4]	50	220	370	270	496	506	588	671	750
Pacific Southwest[5]	150	240	650	780	1,274	1,519	1,666	1,789	1,870
ROUNDWOOD CONSUMPTION (Million cubic feet)									
Northeast	(6)	372	447	374	546	634	728	807	899
North Central	263	335	378	344	692	886	1,091	1,309	1,490
Southeast	577	920	1,255	1,053	2,191	2,690	3,144	3,579	3,946
South Central	547	749	1,336	1,273	1,927	2,462	2,931	3,429	3,890
Rocky Mountains	(6)	14	21	23	41	51	62	72	83
Pacific Northwest[2]									
Douglas-fir subregion[3]	274	234	255	126	597	695	624	592	573
Ponderosa Pine subregion[4]	6	2	2	1	1	1	1	1	1
Pacific Southwest[5]	(6)	10	4	(6)	2	2	2	3	3
PLANT BYPRODUCT CONSUMPTION (Million cubic feet)									
Northeast	(6)	24	73	94	126	156	179	202	228
North Central	....	12	79	105	77	100	117	139	160
Southeast	1	144	264	391	557	557	563	538	510
South Central	1	153	406	564	810	755	734	684	618
Rocky Mountains	(6)	72	112	119	202	250	301	353	403
Pacific Northwest[2]									
Douglas-fir subregion[3]	123	286	475	506	473	358	396	402	394
Ponderosa Pine subregion[4]	1	(6)	24	(6)	47	53	59	63	66
Pacific Southwest[5]	(6)	55	146	(6)	174	199	219	233	241

[1]Includes chips and other byproducts obtained from primary manufacturing plants such as sawmills and veneer plants.
[2]Excludes Alaska.
[3]Western Washington and western Oregon.
[4]Eastern Washington and eastern Oregon.
[5]Excludes Hawaii.
[6]Not available.

growing economic scarcity of a basic raw material.

Social, Economic, and Environmental Effects of Rising Timber Prices

A growing economic scarcity of timber and the associated increases in the relative prices of stumpage and timber products will have significant effects on the economy, the environment, and general social well-being.[7]

Consumer Effects. From an economic point of view, the greatest losses from rising relative prices will be sustained by consumers.

Home buyers will be most affected by the increases in the timber product prices. Analysis of the relationship between lumber prices and construction costs indicates that a 1.0 percent increase in the price of softwood lumber will lead to a 0.16 percent increase in the construction cost index of residences.[8] Approximately 48 percent of the price of a new single family home is accounted for by construction materials and labor.[9] This, together with estimates of the elasticity of demand for housing,[10] [11] suggests that a 1.0 percent rise in the price of lumber will lead to a 0.08 percent decrease in the number of housing units built.

The magnitudes of projected increases in equilibrium softwood lumber prices, shown in table 8.11, indicate that the output of housing units in the period 2000-2030 will be some 3 to 4 percent less than it would have been if softwood lumber prices had been constrained to base level rates of increase. In overall terms, the increase in softwood lumber price from its actual 1977 level to its projected 2030 level would result in a 7 percent reduction in the output of dwelling units. Increased substitution of competing materials might partially mitigate this impact, but the possibility of future upward movements in the relative prices of competing materials also must be considered, as must the costs of adapting building technology to utilize them. Furthermore, the lower degree of competition among suppliers of some substitute materials may result in un-

[7] For further amplification of the following material see: McKillop, William. Social, economic, and environmental effects of rising timber prices. U.S. Department of Agriculture, Forest Service. [In process.]

[8] Boeckh construction costs index. Reported by U.S. Department of Commerce. Construction Review. Washington, D.C.

[9] National Association of Homebuilders Monthly Report (22)7. Washington, D.C. p. 1–3. July, 1977.

[10] Reid, Margaret G. Housing and income. Univ. of Chicago Press, Chicago. 405 p. 1962.

[11] Muth, Richard F. The demand for nonfarm housing. *In* The demand for durable goods. Arnold C. Harberger, ed. Univ. of Chicago Press, Chicago. p. 29–96. 1960.

Rising prices of stumpage and timber products will have significant and adverse effects on the economy, the environment, and general social well-being. Home buyers will be the most affected.

desirably rigid pricing practices in markets for building materials.

Increases in consumer expenditures for commodities such as houses and furniture, made wholly or in part from timber products, are another major consequence of rising timber prices. The effect of rising timber prices will be partially offset by substitution of competing materials, but despite this, consumers will suffer substantial potential reductions in well-being. It is estimated that they will pay some $7 billion more for wood products and competing materials in 2030 because of the lack of sufficient softwood timber to maintain relative prices of softwood lumber and plywood at the 1977 level. This increase in consumer expenditures is measured in 1967 dollars—measured in 1979 dollars, they would more than double.

Industry Effects. Costs to consumers of future rises in stumpage and timber products prices are clearly identifiable. The effects on producers will, however, be mixed.

Rising relative stumpage prices will, of course, benefit many stumpage owners, although the increase in returns per unit of stumpage sold will be offset to some extent by reductions in the total volume sold. The timber processing industries, as distinct from stumpage owners, may experience increased reductions in future net revenues relative to what would have been received if stumpage supplies were large enough to meet base level demands. Further, it is estimated that rates of price increase for stumpage will be substantially higher than the rates for lumber and plywood. Thus, wood processors will be under considerable pressure to invest in new equipment and adopt manufacturing processes that reduce production costs and make more effective use of raw materials. Firms that are unable to make this adjustment will likely face serious difficulties.

Looked at in another way, the growing economic scarcity of timber will reduce markets and limit the expansion potential of the timber industries, particularly the lumber industry, which is dependent on relatively large, higher quality sawtimber. For example, softwood lumber demand in 2000 and 2030 with equilibrium prices would be 7 and 9 billion board feet, respectively, below what it would have been with base level prices (table 8.12). In these same years, the demand for softwood plywood under equilibrium prices would be reduced by 2.3 and 5.2 billion square feet, respectively (table 8.14).

Employment Effects. The growing economic scarcity of timber and rising relative prices are likely to have substantial and adverse impacts on employment. An indicator of this is the prospective effects on employment and payrolls in the logging and timber processing industries. Employment per unit of lumber and plywood produced in the United States dropped quite sharply until the mid-1960's, but has leveled off since then. Some slight further declines may occur as manufacturers install labor-saving equipment in an effort to hold down costs in the face of rising prices for raw materials. However, the absence of any significant current trend suggests that future levels of employment per unit of output may be close to those at the present time.

On this basis, it is estimated that the 17 billion board feet shortfall in softwood supplies—the difference between demands and supplies with base level price trends, as shown in table 8.1, would be associated with a level of timber industry employment in the year 2030 that is some 90,000 person-years below the levels that would have existed if softwood timber supplies were large enough to meet base level projections of demands. Impacts on total economy-wide employment would be much larger because of impacts on trade, service and other industries.

Multiplier estimates derived by input-output analysis indicate that the associated total potential job losses in regional economies will exceed 250,000. Although, nationally, there will be substantial losses in timber industry employment associated with rising timber prices, employment in some timber-producing regions will increase due to regional shifts in production. In addition, some of the employment and payroll gains in timber-producing regions may be offset by employment losses in other U.S. regions because increases in lumber and plywood output may result in lower levels of production of substitute products such as steel and concrete.

A substantial proportion of increased domestic lumber production at the lower base-level prices would, however, displace imports from Canada rather than domestically produced substitutes. Furthermore, it should be noted that rates of unemployment are characteristically higher in timber-dependent communities than for the Nation as a whole, mainly because of declining levels of timber output, whereas the corresponding effect on employment in substitute industries is likely to be geographically diffused, and masked by upward trends in output due to increasing demand.

Energy and Environmental Effects. The effects of rising relative stumpage and timber product prices on the Nation's energy consumption and on environmental quality are also substantial. Materials that are used as common substitutes for wood such as steel, aluminum, concrete, and plastics are derived from nonrenewable resources. The exploitation of increasingly lower grades of many nonrenewable resources may become prohibitively expensive.[12] Further,

[12] Cook, Earl. Limits to the exploitation of nonrenewable resources. *Science*, Vol. 191, No. 4228. p. 677–682. 1976.

Table 8.18—*Roundwood and plant byproduct*[1] *consumption in the woodpulp industry in the contiguous States, by softwoods and hardwoods and region, 1952, 1962, 1970, and 1975, with projections (equilibrium price trends) to 2030*

(Million cubic feet)

Species group and region	1952	1962	1970	1975	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Northeast	(2)	249	289	248	317	348	377	400	428
North Central	178	124	143	151	199	229	257	284	303
Southeast	521	882	1,209	1,148	2,045	2,330	2,583	2,797	2,958
South Central	464	650	1,292	1,384	1,932	2,231	2,503	2,742	2,922
Rocky Mountains	(2)	86	133	142	243	301	362	425	486
Pacific Northwest[3]									
Douglas-fir subregion[4]	397	521	710	606	1,021	1,004	977	954	929
Ponderosa Pine subregion[5]	6	(2)	26	(2)	47	54	59	64	67
Pacific Southwest[6]	(2)	65	151	(2)	175	201	220	234	243
HARDWOODS									
Northeast	(2)	147	232	219	357	442	530	610	699
North Central	85	209	313	298	570	757	951	1,164	1,347
Southeast	56	182	309	296	702	917	1,124	1,321	1,498
South Central	86	252	449	453	805	987	1,162	1,372	1,586
Rocky Mountains	(2)	...	....	....	....	....	....	....	....
Pacific Northwest[3]									
Douglas-fir subregion[4]	...	...	20	27	49	48	43	40	37
Ponderosa Pine subregion[5]	...	(2)	....	(2)	....	....	....	....	....
Pacific Southwest[6]	(2)	...	....	(2)	1	1	1	1	1

[1]Includes chips and other byproducts obtained from primary manufacturing plants such as sawmills and veneer plants.
[2]Not available.
[3]Excludes Alaska.
[4]Western Washington and western Oregon.
[5]Eastern Washington and eastern Oregon.
[6]Excludes Hawaii.

large amounts of energy are required to mine, transport, and process most nonrenewable resources,[13] and there are serious problems of waste disposal and deteriorating environmental quality associated with the rapidly growing use of such materials.[14] On the other hand, lumber and other solid wood products are in a relatively favorable position because of lower energy requirements, recyclability, biodegradability, and the reduced levels of air and water pollutants associated with their manufacture.[15]

The possibility of adverse environmental and energy impacts depends to a large extent on the degree to which materials displace wood products as timber prices rise. Reports of the Committee on Renewable Resources for Industrial Materials provide information on the technical substitutability of competing materials in residential construction.[16] This information suggests that a 17 billion board foot loss in timber output would involve an increase of some 40 million tons in the use of concrete and some 20 million tons of steel. On the basis of the findings of a Committee panel, it was estimated that 17 billion board feet of softwood timber would require some 60 trillion British thermal units (BTU) of energy for its extraction, processing, and transportation.[17] More than eight times this amount of energy would be required to produce the concrete and steel necessary to replace a like quantity of timber products in home construction.

Similar significant impacts may occur in relation to environmental quality as a result of substitution of competing materials for timber products. The production of these substitute materials results in substantially higher emissions of air and water pollutants. Implementation of air and water quality legislation will do much to lessen this pollution, but expenditures for controlling it represent substantial costs to society through higher prices, reduced output, or diversion of investment capital.[18,19] In addition, the greater energy demands of the steel, aluminum, concrete, and plastics industries means that any impairment of environmental quality is accentuated by potential pollution associated with increased power generation.

The impacts of substitution are not restricted to domestically produced materials. Imports of timber products, especially softwood lumber from Canada, can be expected to rise during the early decades of the projection period, along with imports of substitute materials such as steel. Increased domestic production of energy-demanding substitutes will

[13] Abelson, Philip H., and Allen H. Hammong. The new world of materials. *Science,* Vol. 191, No. 4228. p. 633–636. 1976.

[14] Carpenter, Richard A. Tensions between materials and environmental quality. *Science,* Vol. 191, No. 4228. p. 665–668. 1976.

[15] Cliff, Edward P. Timber: the renewable resource. Report to the National Commission on Materials Policy. Washington, D.C. 149 p. 1973.

[16] Committee on Renewable Resources for Industrial Materials. Renewable resources for industrial materials. National Research Council, Washington, D.C., 267 p. 1976.

[17] Boyd, C. S., P. Koch, H. B. McKeen, C. R. Morschauser, S. B. Preston, and F. F. Wangaard. Wood for structural and architectural purposes. Report of CORRI, Panel II. *Wood and Fiber.* 8(1):1–72. 1976.

[18] Carpenter, Richard A. *Op. cit.*

[19] LeSourd, D. A., M. E. Fogel, A. R. Schleicher, and T. E. Bingham. Comprehensive study of specific air pollution sources to assess the economic effects of air quality standards. Research Triangle Institute. Research Triangle Park, North Carolina. 76 p. 1970.

lead to greater importation of petroleum products. These changes, together with the possibility that exports of many products could be dampened by rising timber prices, means that the United States balance of trade could be significantly affected.

In summary, it seems that rising relative prices of stumpage and timber products will have far-reaching consequences of a diverse and complex nature. Consumer expenditures will increase, timber industry employment and output will decrease, environmental quality will be adversely affected, greater demands for energy will occur, and there may be a significant effect on the balance of payments. The President's Advisory Panel on Timber and the Environment concluded that "the long-term needs of people and the Nation will be better served by increased production and improved use of timber rather than by increased reliance on nonrenewable minerals." [20] The low cost of wood is a major factor in its ability to compete with alternative materials. Restraining future rises in timber prices through increases in supply presents an opportunity to satisfy future demands for industrial materials at minimal cost to the individual citizen and to society.

[20] President's Advisory Panel on Timber and the Environment. Arlington, Va. 541 p. April 30, 1973.

Chapter 9
Opportunities for Increasing Timber Supplies

Chapter 9. Opportunities for Increasing Timber Supplies

The economic, social, and environmental implications described above are not inevitable. Commercial timberlands have the physical potential to produce much larger quantities of timber — enough to meet the projected demands in the latter decades of the projection period. Achieving more of the potential, however, will require time and substantial investments in a variety of management, research, and assistance programs.

Recent Trends in Timber Management, Research, and Assistance Programs

Annual expenditures by the public and private sectors in timber management research, and assistance activities currently amount to about $2 billion. This is the high in a trend that has been rising for decades. There are no quantitative data showing the way total investments have increased over time or by types of programs. However, Forest Service appropriations provide one indicator of recent trends in investments in the various programs. In total, these appropriations account for nearly half of all expenditures on timber management, research, and assistance activities.

Forest Service appropriations for such activities increased more than five times between 1950 and 1977, rising from $115 million to $562 million, measured in constant 1972 dollars (table 9.1). Nearly half of this growth was in funds for road construction and maintenance. Most of the rest of the increase was for general management activities such as sales administration, reforestation, timber stand improvement, and slash disposal.

There were increases in funding for fire and insect and disease management in the 1950's and early 1960's but not much change since that time. Funding for research increased steadily but currently represents only 8 percent of Forest Service appropriations. Funding for assistance to State and private landowners measured in constant 1972 dollars has been relatively constant in recent years. In 1978, it represented only 6 percent of Forest Service appropriations.

The Nation's commercial timberlands have the physical potential to meet all foreseeable demands for timber by 2030. Achieving this potential will require large investments in a variety of management, research, and assistance programs.

Trends in Management. Timber management as used in this study includes the land and stand management activities that are designed to increase timber growth and protect against losses. Such activities include stand regeneration, timber stand improvement, fertilization, fire management, and insect and disease management.

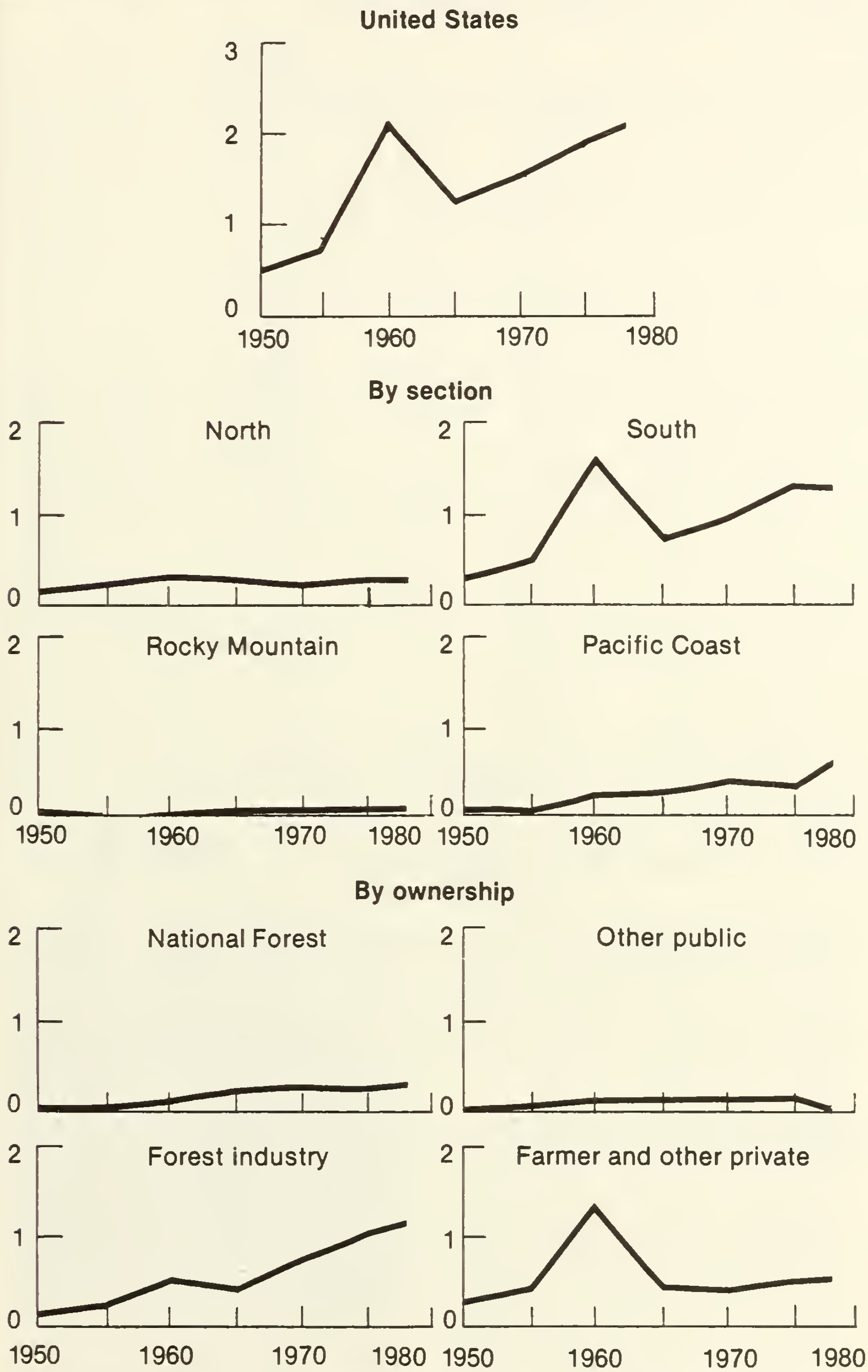
Regeneration.—Most forest regeneration occurs naturally or through harvest practices designed to encourage natural regeneration, but the acreage planted and direct seeded each year has been rising (table 9.2). Nearly all regeneration through planting and seeding is with commercially important softwood species, chiefly southern pines and Douglas-fir.

Trends in artifical regeneration during the 1950's and early 1960's were somewhat different from those of the last decade. In this earlier period, the average acreage planted and seeded increased significantly on all ownerships across all geographic sections (fig. 9.1). However, the major portion of the increased regeneration in the late 1950's and early 1960's was on farmer and other private ownerships in the South. This was a direct result of the Soil Bank Program, which made payments to farmers for cropland retirement during a period of low farm product prices. Areas regenerated on this ownership declined sharply in the early 1960's to between 400,000 and 500,000 acres a year—a level that has been maintained with some fluctuation to the present time.

Since the early 1960's, most of the increased artificial regeneration has been on forest industry ownerships in the South and Pacific Coast sections. Over the last decade, the average annual acreage planted and seeded on the forest industry ownerships more than doubled. There was also a slight increase in the acreage planted and seeded on National Forests, but a slight de-

Figure 9.1

Area Planted and Direct-Seeded, 1950-78
Million acres



crease on other public ownerships. The large increase in the acreage regenerated by industry presumably reflects in large part the higher rates of timber harvests and concern about the availability of timber from other ownerships. It also reflects in part the regeneration of recently purchased lands to desired species.

There are no statistically reliable data on tree survival on the areas planted but various estimates suggest an average survival of around 70 to 75 percent in the South and a somewhat lower rate in other sections. Survival rates are highest where adequate site preparation precedes planting or direct seeding. Environmental constraints on the use of pesticides could adversely affect survival rate and the use of direct seeding unless environmentally acceptable pesticides or other effective ways of controlling rodents, competing vegetation, and other pests can be developed.

In the last few years, 65 percent of the acreage planted and seeded was in the South, 22 percent was in the Pacific Coast, 9 percent was in the North, and 4 percent was in the Rocky Mountain section of the United States. Forest industry ownership accounted for 57 percent of the acreage, while farmer and other private ownerships composed 22 percent. The private sector as a whole accounted for 77 percent of the acreage. Most of the planting and seeding on public lands was on the National Forests.

In the past, nearly all artificial regeneration was based on the use of seedlings raised in nurseries. This is still the dominant form of regeneration. Both industry and government are increasing their efforts to plant superior trees by improving the quality of seedlings raised in nurseries. In the last couple of decades, however, effective direct seeding methods have been developed for commercially important species such as the southern pines. Direct seeding accounted for about 4 percent of the area regenerated in 1978, a total of 80,000 acres. About 54 percent of the direct seeding in 1978 was in the South and 12 percent on the Pacific Coast. Sixty-seven percent of the area direct seeded in 1977 was on privately owned lands.

A relatively small portion of the acreage harvested annually is regenerated by planting and seeding of forest trees. In the past, a large part of the seeding and planting in the South has been on former crop and pasture land. In recent years, a growing proportion of the planting and seeding in this section and nearly all of that in the West has been on cutover lands.

The area planted and seeded annually composes a very small part of the area of commercial forest land. Currently about 0.4 percent of the commercial timberland base is planted and seeded each year. There are, however, significant differences among ownerships and regions. About 1.6 percent of the commercial timberland in forest industry ownerships and 0.1 percent of that in farmer and other private owner-

Table 9.1—*Forest Service appropriations*[1] *for timber management, research, and assistance programs in the United States, 1950–78*

(Million dollars)

Year	Total		National Forest						Insect and disease management[3]		Research[4]		Assistance to States and private landowners[5]	
			General management[2]		Road construction and maintenance		Fire management							
	Current dollars	1972 dollars[6]	Current dollars	1972 dollars[6]	Current dollars	1972 dollars[6]	Current dollars	1972 dollars[6]	Current dollars	1972 dollars[6]	Current dollars	1972 dollars[6]	Current dollars	1972 dollars[6]
1950	45.7	114.6	10.9	27.3	10.3	25.8	7.5	18.8	2.1	5.3	4.9	12.3	10.0	25.1
1951	53.4	113.4	11.6	24.6	10.3	21.9	13.7	29.1	2.1	4.5	5.1	10.8	10.6	22.5
1952	58.9	120.4	11.9	24.3	13.0	26.6	13.8	28.2	4.5	9.2	5.1	10.4	10.6	21.7
1953	60.9	121.4	15.6	31.1	11.0	21.9	14.1	28.1	4.1	8.2	5.4	10.8	10.7	21.3
1954	64.9	128.8	17.1	33.9	14.5	28.8	14.2	28.2	3.1	6.2	5.3	10.5	10.7	21.2
1955	70.0	136.9	17.9	35.0	16.0	31.3	14.0	27.4	4.9	9.6	6.5	12.7	10.7	20.9
1956	85.3	159.8	21.2	39.7	24.0	45.0	14.7	27.5	6.3	11.8	7.8	14.6	11.3	21.2
1957	94.9	170.5	28.1	50.5	24.0	43.1	15.5	27.8	5.1	9.2	10.0	18.0	12.2	21.9
1958	104.2	179.4	33.0	56.8	24.3	41.8	16.3	28.1	5.2	9.0	11.7	20.1	13.7	23.6
1959	104.4	177.8	32.4	55.2	26.0	44.3	16.6	28.3	5.7	9.7	11.0	18.7	12.7	21.6
1960	115.5	195.5	42.3	71.6	26.0	44.0	17.3	29.3	5.9	10.0	11.7	19.8	12.3	20.8
1961	132.3	220.6	48.6	81.0	31.0	51.7	19.9	33.2	7.0	11.7	13.5	22.5	12.3	20.5
1962	171.5	277.6	65.6	106.2	37.0	59.9	25.4	41.1	9.4	15.2	17.3	28.0	16.8	27.2
1963	177.2	279.8	66.1	104.4	39.5	62.4	26.6	42.0	10.4	16.4	17.8	28.1	16.8	26.5
1964	216.5	334.1	77.3	119.3	63.2	97.5	27.8	42.9	10.8	16.7	20.5	31.6	16.9	26.1
1965	227.0	338.8	78.0	116.4	70.3	104.9	28.0	41.8	10.6	15.8	22.5	33.6	17.6	26.3
1966	250.4	357.3	85.0	121.3	78.7	112.3	29.1	41.5	12.2	17.4	26.9	38.4	18.5	26.4
1967	278.6	383.8	87.6	120.7	101.2	139.4	30.1	41.5	12.4	17.1	28.4	39.1	18.9	26.0
1968	299.2	391.6	94.8	124.1	110.0	144.0	31.2	40.8	11.6	15.2	30.8	40.3	20.8	27.2
1969	284.4	355.6	97.2	121.5	91.0	113.8	31.7	39.6	11.8	14.8	31.9	39.9	20.8	26.0
1970	305.1	353.1	105.1	121.7	100.6	116.4	32.2	37.3	9.6	11.1	33.9	39.2	23.7	27.4
1971	351.4	379.5	129.3	139.6	115.0	124.2	33.5	36.2	11.3	12.2	37.4	40.4	24.9	26.9
1972	412.3	412.3	154.9	154.9	138.7	138.7	35.8	35.8	10.6	10.6	43.6	43.6	28.7	28.7
1973	449.2	424.5	161.0	152.2	158.8	150.1	36.4	34.4	10.6	10.0	48.6	45.9	33.8	32.0
1974	402.1	247.1	188.2	162.4	90.7	78.3	36.4	31.4	10.6	9.2	47.4	40.9	28.8	24.9
1975	491.4	385.5	224.1	175.8	120.9	94.8	40.6	31.9	11.2	8.8	58.7	46.0	35.9	28.2
1976[7]	633.2	469.7	314.1	233.0	112.9	83.8	59.5	44.1	22.7	16.8	79.6	59.1	44.4	32.9
1977	806.7	561.9	258.6	180.1	381.1	265.4	47.5	33.1	15.9	11.1	68.9	48.0	34.7	24.2
1978	938.0	605.9	325.6	210.3	387.9	250.6	66.8	43.1	24.7	16.0	79.0	51.0	54.0	34.9

[1]Includes those funds in the annual appropriations acts which are primarily or totally spent for timber related activities. Does not include supplemental appropriations used for fighting fires or other similar purposes.
[2]Includes sales administration and management; reforestation and timber stand improvement and trust funds for cooperative work which includes logging, slash disposal, erosion reduction, and reforestation work in National Forest timber sale areas.
[3]These funds are used for insect and disease activities on Federal, State, and private forest land ownerships.
[4]Includes funds for timber management; fire, insect and disease protection; product utilization and engineering and resource economics research. Funds for range management research are included from 1950–58.
[5]Includes funds for forest management and utilization, cooperative fire protection, tree seedling production, and tree improvement.
[6]Converted to 1972 dollars by dividing the appropriations in current dollars by the implicit price deflators for gross national product for Federal government purchases of goods and services as reported by the U.S. Department of Commerce.
[7]Includes a period of 15 months when the Federal government converted from a July-June to an October-September fiscal year.

Table 9.2—*Area planted and direct-seeded in the United States, by section and ownership, 1950–78*

(Thousand acres)

Year	United States	Section: North	Section: South	Section: Rocky Mountain	Section: Pacific Coast	Ownership: National Forest	Ownership: Other public	Ownership: Forest industry	Ownership: Farmer and other private
1950	488	137	285	15	52	45	54	153	237
1951	453	164	245	15	29	46	49	106	253
1952	520	191	250	15	63	50	67	143	260
1953	710	212	420	17	60	53	89	217	352
1954	808	236	506	17	49	54	70	265	419
1955	779	242	482	5	51	56	72	239	413
1956	886	235	574	7	70	61	84	257	484
1957	1,138	258	782	7	91	85	86	311	657
1958	1,533	285	1,080	7	161	89	119	370	955
1959	2,117	283	1,642	13	179	112	123	417	1,465
1960	2,100	308	1,567	14	212	134	130	521	1,315
1961	1,761	302	1,205	18	235	163	140	588	870
1962	1,366	270	816	27	253	198	151	443	573
1963	1,325	270	798	37	221	221	151	467	486
1964	1,313	269	756	42	246	208	161	485	460
1965	1,285	268	708	64	245	233	136	455	461
1966	1,281	265	696	69	251	237	144	475	425
1967	1,373	245	769	65	294	257	132	527	457
1968	1,439	281	795	69	294	269	128	604	437
1969	1,431	250	808	73	300	257	127	681	367
1970	1,577	225	925	70	357	261	131	763	422
1971	1,667	271	1,002	84	310	267	124	895	381
1972	1,647	211	1,014	68	354	268	114	828	436
1973	1,721	195	1,051	81	394	299	123	879	420
1974	1,576	168	1,037	65	306	272	116	836	352
1975	1,900	249	1,269	73	309	293	138	1,059	410
1976	1,858	184	1,172	76	426	292	135	1,040	391
1977	1,942	160	1,301	57	424	257	120	1,138	427
1978	2,072	233	1,245	74	520	296	124	1,145	507

Sources: U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management; and cooperating State forestry agencies.

Most forest regeneration occurs naturally, but the acreage planted with nursery-grown stock or direct seeded has been rising and now amounts to about 2 million acres per year.

ships is planted and seeded annually. On National Forest and on other public ownerships, about 0.3 percent is planted and seeded each year. The average annual acreage planted and seeded represents 0.1 percent of the commercial timberland base in the North, 0.7 percent in the South, 0.6 percent in the Pacific Coast, and 0.1 percent in the Rocky Mountain section of the United States.

Intermediate stand treatments.—Intermediate stand treatments generally include all measures taken to increase growth between the time of stand establishment and harvest. Measures include deadening of less desirable tree species, precommercial thinning in young stands, release from competing vegetation (weeding), pruning, and fertilization. In the last decade, intermediate treatments have held relatively constant at an average of 1.4 million acres treated per year (table 9.3). In the last few years most of the treatments have been on forest industry lands in the South and Pacific Coast sections and on National Forests in the Rocky Mountain section.

Although there hasn't been much change in the area on which some kind of timber stand treatment has taken place, there have been significant changes by section and ownership. For example, there has been a large drop in the area treated in the South but substantial increases in the Rocky Mountains and on the Pacific Coast. There was a large reduction in the area treated in private ownerships, mostly on the farmer and other private, while the area treated on public ownerships increased.

Two practices — precommercial thinning and release/weeding — have accounted for nearly all of the timber stand treatments. Precommercial thinning involves the removal of excess or lower quality trees from the stand in order to accelerate the growth and improve the quality of the remaining trees. Precommercial thinning in the South is normally accomplished by mechanical means. Release or weeding normally involves the removal of competing vegetation such as brush or undesirable tree species by mechanical or chemical means.

Table 9.3—*Reported acreage of intermediate stand treatments in the United States, by section and ownership, 1968–78*

(Thousand acres)

Year	United States	Section				Ownership			
						Public		Private	
		North	South	Rocky Mountain	Pacific Coast	National Forest	Other public	Forest industry	Farmer and other private
1968	1,634	224	1,120	98	192	364	98	652	520
1969	1,315	216	753	91	255	321	126	495	373
1970	1,359	209	785	86	279	304	100	592	363
1971	1,373	166	771	121	315	303	89	679	302
1972	1,422	148	727	144	403	373	99	601	349
1973	1,400	157	913	140	190	354	103	579	364
1974	1,250	150	712	150	238	348	79	571	252
1975	1,410	190	621	200	399	454	133	563	260
1976	1,477	190	656	160	471	441	157	610	269
1977	1,269	210	448	207	404	386	172	533	578
1978	1,393	263	444	201	485	420	98	521	354

Sources: U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management; and cooperating State forestry agencies.

Pruning is typically used only to improve the quality of valuable hardwood stands. Since the acreage of high-value hardwood stands is small, the opportunities for applying this practice in a cost-efficient manner are limited.

Fertilization is another means of improving timber stands. Between the mid-1960's, when fertilization was first tried as a large-scale silvicultural practice, and mid-1978 some 1–2 million acres in the Douglas-fir region and 900,000 acres in the Southeast had been fertilized.[1] Nearly all of this has been on lands in forest industry ownerships.

Efforts to convert timber stands from one species to another are carried out by thinning or deadening less desirable tree species, planting of different species following harvest, and planting of preferred species on abandoned agricultural or other lands. Most of this effort is aimed at converting from lower value hardwoods to softwoods, primarily on private lands in the South.

The area of successful stand conversion is relatively small compared to unplanned reversions from softwood to hardwoods as a result of inadequate regeneration following harvest.[2] For example, between 1970 and 1976 the area in pine types in the South dropped by over 4 million acres; nearly all of this area reverted to hardwoods and to oak/pine types.

Fire management. — The most widespread timber management activity practiced in the United States, and, in many ways, the most important and effective historically, is organized protection against wildfire. Reported expenditures by Federal and State agencies and

The most widespread timber management activity practiced in the United States—and the most effective historically—is protection against fire.

[1] Bengtson, George W., Forest fertilization in the United States: Progress and outlook. J. Forestry 78(4):222–229. April 1979.

[2] U.S. Department of Agriculture, Forest Service. The South's pine reforestation problem and suggested solutions. 1978.

cooperators for organized programs of forest fire protection more than tripled between 1950 and 1977, rising from about $97 million to $318 million in constant 1972 dollars (table 9.4).

Expenditures for the protection of Federal lands have grown at a more rapid rate than those for the protection of State and private lands. Since the mid-1970's, more than 50 percent of total reported expenditures has been for the protection of Federal lands. This is in contrast to the 1950's and 1960's, when most of the reported expenditures were for the protection of State and private lands.

In addition to the reported expenditures shown in table 9.4, there are additional expenditures for purposes related to fire protection such as slash disposal, prescribed burning, and various protection efforts not included in organized programs.

The area protected against wildfire by organized fire management programs now exceeds 1.4 billion acres (table 9.5). Virtually all of the commercial forest land, most of the noncommercial forest, and a large acreage of nonforest watershed are now protected. However, there was still nearly 145 million acres of qualifying rural land that was not receiving protection in 1979.

Since 1950, the acreage burned by widfire has steadily decreased as the area receiving organized protection and the intensity of protection effort have increased (table 9.6, fig. 9.2). However, the relatively rapid reduction in the annual rate of burn experienced in the 1950's has slowed significantly in recent years. Greater risks associated with improved access and greater public use of forests for recreation and other purposes and increased accumulations of fuels in protected timber stands have tended to offset increasing fire management efforts in recent years.

The drop in the area burned has been entirely on State and private ownerships. Further, the decline in the area burned has been on the forest lands in the South. The area burned in Federal ownerships, and in other sections of the country, has shown a lot of fluctuation, presumably in response to varying fire conditions, but no well-defined upward or downward trend, although there has been some decline in the area burned per million acres protected.

Although great progress has been made, an average of more than 1.1 million acres of commercial forest land have burned each year during the 1970's. Approximately 20 percent of this acreage is in Federal ownerships and 80 percent is in State and private ownerships. About 62 percent of the commercial timberland acreage burned was in the South, while 19 percent was in the North, 14 percent was in the Pacific Coast, and 5 percent was in the Rocky Mountains.

A comparison of the relatively flat trend in the area burned of the 1960's and 1970's with the rising trend in expenditures suggests that continuing increases in fire protection may be necessary to offset the risks associated with increased accessibility and use of forest lands and the natural accumulations of fuels on unburned protected areas. And accumulation resulting from management practices such as harvesting and thinning along with constraints on burning such material also contribute to the problem. As described in a later section of this study, accelerated research to improve technology of fire prevention, presuppression and suppression, and other measures such as closer timber utilization could reduce fire risks on timberlands.

Forest insect and disease management.—Annual expenditures for protection from forest insects and diseases increased significantly during the 1950's and early 1960's (table 9.7). Since the mid 1960's, however, there has been no significant growth in expenditures measured in constant 1972 dollars. There have been significant changes among the various sections of the country and the major ownerships. In the early 1970's, there were substantial increases

Table 9.4—*Reported expenditures for forest fire protection in the United States, by ownership, 1950–79*[1]

(Million dollars)

Year	United States		Ownership					
			National Forest		Other Federal		State and private[2]	
	Current dollars	1972 dollars[3]	Current dollars	1972 dollars[3]	Current dollars	1972 dollars[3]	Current dollars	1972 dollars[3]
1950	38	97	8	20	1	3	29	74
1951	47	104	14	31	1	2	32	71
1952	51	108	14	30	1	2	36	76
1953	53	109	14	29	1	2	38	78
1954	54	110	14	28	1	2	39	80
1955	54	108	14	28	1	2	39	78
1956	63	121	19	36	2	4	42	81
1957	70	129	23	42	2	4	45	83
1958	79	141	23	41	4	7	52	93
1959	90	157	29	51	7	12	54	94
1960	103	177	39	67	7	12	57	98
1961	124	209	55	93	8	13	61	103
1962	132	216	58	95	9	15	65	106
1963	116	185	41	65	8	13	67	107
1964	121	189	39	61	9	14	73	114
1965	127	192	40	60	10	15	77	117
1966	131	189	36	52	9	13	86	124
1967	162	223	54	74	17	24	91	125
1968	186	243	71	93	19	25	96	125
1969	175	216	49	60	25	31	101	125
1970	197	225	54	62	29	33	114	130
1971	276	295	112	120	39	42	125	133
1972	245	245	90	90	29	29	126	126
1973	265	248	94	88	37	35	137	125
1974	326	277	146	124	30	25	150	128
1975	349	271	151	117	29	23	169	131
1976	426	312	190	139	46	34	190	139
1977	470	318	197	133	56	38	217	147
1978	450	282	174	109	64	40	212	133
1979	(4)	(4)	208	120	(4)	(4)	216	124

[1]Includes funds for prevention, presuppression, and suppression of forest fires. Also includes appropriations which supplement those from the annual appropriations acts shown in Table 9.1.
[2]Cooperative fire prevention and control expenditures under the Clarke-McNary Act, Section 2.
[3]Converted to 1972 dollars by dividing expenditures in current dollars by the implicit price deflators for gross national product for government purchases of goods and services as reported by the U.S. Department of Commerce.
[4]Not available.

Sources: U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management; and cooperating State forestry agencies.

Table 9.5—*Area qualifying for fire protection and area burned on protected and unprotected lands in the United States,*[1] *by ownership, 1950–79*

(Million acres)

Year	Area qualifying for protection					Area burned				
		Federal		State and private			Federal		State and private	
	Total	Protected	Unprotected	Protected	Unprotected	Total	Protected	Unprotected	Protected	Unprotected
1950	792.9	247.4	118.8	360.6	66.1	15.5	0.4	(2)	3.4	11.7
1951	793.0	247.3	119.1	363.4	63.3	10.9	.5	(2)	3.1	7.3
1952	793.2	247.5	119.0	368.7	58.0	14.2	.3	(2)	6.3	7.6
1953	792.8	247.3	118.8	373.8	52.9	9.9	.3	(2)	2.5	7.1
1954	802.9	252.8	119.0	382.4	48.7	8.8	.2	(2)	2.8	5.8
1955	801.8	251.7	119.0	387.2	44.0	8.1	.4	(2)	2.4	5.0
1956	802.2	252.1	119.0	389.9	41.2	6.6	.4	(2)	1.6	4.6
1957	806.3	252.5	119.0	395.9	38.9	3.4	.2	(2)	1.1	2.1
1958	804.5	369.7	(2)	398.3	36.5	3.3	.3	(2)	1.2	1.8
1959	795.1	360.3	(2)	400.7	34.1	4.2	.9	(2)	1.7	1.6
1960	797.7	362.8	(2)	402.8	32.0	4.4	.6	(2)	1.9	1.9
1961	755.9	313.6	(2)	412.0	30.3	3.0	.3	(2)	1.1	1.6
1962	799.3	356.3	(2)	418.5	24.4	4.1	.3	(2)	1.6	2.2
1963	809.8	356.7	(2)	431.3	21.8	7.1	.2	(2)	3.1	3.8
1964	1,132.1	653.7	(2)	446.4	32.0	4.2	.2	(2)	1.7	2.3
1965	1,157.4	655.0	(2)	472.0	30.3	2.6	.1	(2)	1.2	1.3
1966	1,171.6	655.4	(2)	469.3	46.7	4.6	1.3	(2)	1.9	1.4
1967	1,171.8	654.6	(2)	479.6	37.6	4.6	.3	(2)	1.9	2.4
1968	1,165.0	650.0	(2)	486.5	28.5	4.2	1.2	(2)	1.6	1.4
1969	1,194.9	651.8	(2)	512.0	31.1	6.7	4.1	(2)	1.6	1.0
1970	1,279.0	647.2	65.5	520.5	45.8	3.2	.7	(2)	1.5	1.0
1971	1,326.2	646.7	65.5	574.4	39.5	4.2	1.7	(2)	1.8	.7
1972	1,407.5	652.0	64.8	631.2	59.6	2.7	1.2	(2)	1.1	.4
1973	1,405.6	660.9	54.2	626.5	64.0	2.0	.7	(2)	1.1	.2
1974	1,504.4	678.3	54.2	708.1	63.8	2.9	1.2	(2)	1.5	.2
1975	1,529.4	677.9	54.2	726.4	70.8	1.8	.4	(2)	1.1	.3
1976	1,572.9	680.2	54.2	737.2	101.2	5.1	.5	(2)	2.1	2.5
1977	1,682.5	681.6	54.2	748.7	198.0	3.2	.8	(2)	2.1	.3
1978	1,602.2	680.2	54.2	773.8	94.0	3.9	.2	(2)	1.5	2.2
1979	1,607.5	680.2	54.2	783.5	89.5	3.0	1.3	(2)	1.3	.4

[1]Alaska excluded from State and private lands prior to 1960; Hawaii excluded from Federal lands 1950–51.
[2]Not available.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management; and cooperating State forestry agencies.

in expenditures in the North and to a lesser extent in the South. These increases were on private and nonfederal ownerships. In contrast in the early 1960's and again in the early 1970's there were substantial decreases in expenditures on the National Forests. Nearly all of the reduction was in the Rocky Mountains. It reflects the phasing out of the programs to control white pine blister rust and the Black Hills bark beetle in the 1960's, and mountain pine beetle and mistletoe in the 1970's.

In recent years, about one-half of the expenditures for insect and disease management was for protection of Federal ownerships. About 41 percent of these expenditures was in the North and 25 percent in the South; most of the remainder was in the Rocky Mountains.

During the 1970's, most expenditures were for the protection of private and other public ownerships in the North and South. During the 1960's most were for the protection of Federal ownerships in the Rocky Mountain and Pacific Coast sections.

In the Pacific Coast and Rocky Mountain sections, most recent losses from insects and disease have been caused by spruce budworm, tussock moth, dwarf mistletoe, and mountain pine and western pine engraver beetles. Since 1972, approximately $4 million has been spent for spruce budworm suppression, $3.9 million for mountain pine beetle suppression, and $3.2 million for suppression of the Douglas-fir tussock moth.

In the South, most of the expenditures—$7.4 million since 1972—have been for the suppression of the southern pine beetle, the most damaging pest in that section. Other expenditures have been directed at suppressing other bark beetles, sawflies, pales weevil, fall cankerworm, balsam woolly aphid, and seed orchard insects such as seed and cone insects and tip moth. Diseases such as fusiform rust, brown spot needle blight, littleleaf disease, annosus root rot, and pitch canker have also caused serious mortality and growth loss in pine stands. Silvicultural and chemical suppression methods are available for some of these diseases; however, tree breeding for genetic resistance offers the best method for control of certain diseases.

In the North, recent suppression efforts have been mainly concentrated on the gypsy moth in Pennsylvania, New York, New Jersey, and Rhode Island;

Table 9.6—*Protected forest and commercial timberland burned by wildfire in the United States, by section and ownership, 1950–78*

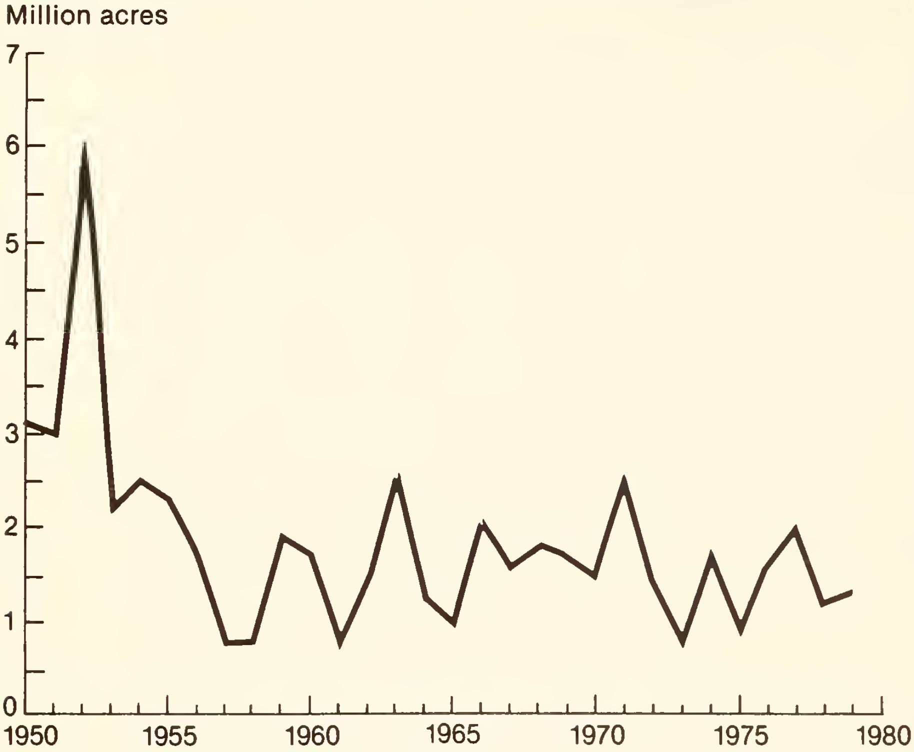
(Thousand acres)

Year	United States: Forest land	United States: Commercial timberland	Section: North: Forest land	North: Commercial timberland	South: Forest land	South: Commercial timberland	Rocky Mountain: Forest land	Rocky Mountain: Commercial timberland	Pacific Coast: Forest land	Pacific Coast: Commercial timberland	Ownership: Federal: Forest land	Federal: Commercial timberland	State and private: Forest land	State and private: Commercial timberland
1950	3,076	.....	253	...	2,597	.....	78	...	148	...	169	...	2,907	.....
1951	2,953	.....	279	...	2,278	.....	81	...	315	...	229	...	2,724	.....
1952	5,960	.....	1,899	...	3,950	.....	27	...	84	...	179	...	5,781	.....
1953	2,239	.....	766	...	1,397	.....	52	...	24	...	110	...	2,129	.....
1954	2,529	.....	298	...	2,168	.....	19	...	44	...	88	...	2,441	.....
1955	2,330	.....	182	...	1,917	.....	22	...	209	...	191	...	2,139	.....
1956	1,670	.....	258	...	1,173	.....	142	...	97	...	289	...	1,381	.....
1957	782	.....	228	...	516	.....	15	...	23	...	29	...	753	.....
1958	768	.....	164	...	521	.....	35	...	48	...	56	...	712	.....
1959	1,870	.....	353	...	854	.....	36	...	627	...	566	...	1,304	.....
1960	1,725	.....	318	...	1,111	.....	84	...	212	...	240	...	1,485	.....
1961	847	.....	113	...	570	.....	92	...	72	...	129	...	718	.....
1962	1,377	1,272	328	324	945	900	28	9	76	39	127	59	1,250	1,213
1963	2,571	2,447	897	878	1,592	1,532	42	19	40	18	113	67	2,458	2,380
1964	1,289	1,129	527	507	574	559	52	17	136	46	152	32	1,137	1,097
1965	962	895	198	177	588	569	20	4	42	31	72	38	890	857
1966	2,119	1,867	241	230	1,032	1,026	158	57	688	554	799	576	1,320	1,291
1967	1,578	1,396	190	163	1,105	1,075	150	98	133	60	244	120	1,334	1,276
1968	1,759	1,314	202	180	836	818	76	24	645	292	654	270	1,105	1,044
1969	1,671	1,485	223	211	753	733	48	11	647	530	559	504	1,112	981
1970	1,484	1,134	162	148	755	739	50	26	517	221	474	198	1,010	936
1971	2,516	1,597	236	223	1,039	991	200	171	1,041	212	1,251	391	1,265	1,206
1972	1,368	990	82	74	479	451	50	24	757	441	792	461	576	529
1973	802	621	147	115	384	374	109	48	162	84	201	85	601	536
1974	1,728	953	165	144	746	715	141	67	676	27	747	84	981	869
1975	933	634	138	113	557	479	53	19	185	23	209	45	724	589
1976	1,632	1,441	521	512	918	863	58	17	135	49	209	121	1,423	1,320
1977	1,979	1,709	448	434	1,037	984	87	39	407	252	377	229	1,602	1,480
1978	1,227	1,084	128	109	967	921	45	20	87	34	113	53	1,114	1,031

Sources: U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management; and cooperating State forestry agencies.

Figure 9.2

Area of Protected Forest Land Burned, 1950-79



spruce budworm in Maine and Minnesota; and oak wilt in West Virginia. Since 1972, approximately $9 million has been expended for spruce budworm suppression and $2.6 million for gypsy moth suppression.

Forest Landowner Assistance. Assistance to private commercial timberland owners is provided by both the public and private sectors through a wide variety of programs. A substantial portion of the activities in stand regeneration, timber stand improvement, and improvements in harvesting and utilization on the farm and other private ownerships is a result of such educational, technical assistance, and cost-sharing programs.

Educational programs. — Educational programs inform landowners of opportunities for protecting and managing their lands and of sources of assistance that are available should the landowner decide to actively manage his land. Because landowners must decide to actively manage their lands before they implement a forest management program, educational programs are often a prerequisite for improving the management of private forest lands.

Technical assistance programs.— Technical assistance programs, usually concerned with the preparation and implementation of management plans, are designed to assist landowners who have decided to actively manage their lands. Public sector programs providing technical assistance are administered by the Forest Service, Soil Conservation Service, in cooperation with State forestry agencies, and local conservation districts. These public sector programs include the rural forestry assistance (service forestry), woodland conservation, watershed protection, flood prevention, and resource conservation and development programs. Private sector programs include landowner assistance programs provided by individual companies in the forest products industry and a wide range of services provided to landowners by consulting foresters.

The rural forestry assistance (formerly called cooperative forest management) is the principal technical assistance program provided by the public sector. In this program, State forestry agencies, cooperating with the Forest Service, provide technical information, advice, and related assistance to private forest landowners regarding forest resource management which may include site preparation, reforestation, thinning, prescribed burning and other silvicultural practices. Landowner objectives may also include wildlife habitat improvements, esthetics, and soil and water protection. Assistance is also provided in the harvesting, processing, marketing, and utilization of wood, wood products, and other forest resources.

Reported expenditures in 1972 dollars under this program increased from about $3.3 million in 1950 to about $17.6 million in 1977 (table 9.8). Although Federal expenditures have remained about constant since 1965 there have been increases in expenditures in all sections from State funds. Most of the increase has been in the South and the North.

State expenditures accounted for 77 percent of total funding during the 1975–77 years. In this recent period, 36 percent of total program expenditures were in the North and 51 percent in the South. The remaining 13 percent of the expenditures were about equally divided between the Rocky Mountain and Pacific Coast sections.

In the private sector, the largest share of technical assistance is provided by consulting foresters. In return for fees paid by the forest landowner, consulting foresters provide detailed management advice, market forest products, and arrange for equipment and labor to get forestry work done. A survey conducted by the Association of Consulting Foresters in 1976 [3] indicated that the more than 1,300 consulting foresters in the United States were then providing assistance worth an estimated $80 million annually in fees. Moreover, the consulting forestry business is growing at an estimated rate of about 10 percent per year.

Landowner assistance programs provided by individual companies in the forest products industry have also been growing rapidly. This assistance is usually provided in return for the opportunity to bid on the landowner's timber when he decides to sell or for regeneration after the timber has been purchased and harvested. Technical assistance is usually free and other practices provided at cost. These programs are strongest in the South, where 39 companies provide assistance through more than 120 foresters. Programs are now also growing in the Pacific Coast and Rocky Mountain sections, where more than 10 companies provide landowner assistance.

Cost-sharing programs.—Cost-sharing programs are directly linked to on-

[3] Martin, James W., 1976 Survey of North American Forestry Consultants. The Consultant, 22(2):29. April 1977.

Table 9.7—*Reported expenditures for forest insect and disease management in the United States, by section and ownership, 1960–79*

(Million dollars)

Year	United States		Section								Ownership					
			North		South		Rocky Mountain		Pacific Coast		National Forest		Other Federal		Private and other public[1]	
	Current dollars	1972 dollars[2]	Current dollars	1972 dollars[2]	Current dollars	1972 dollars[2]	Current dollars	1972 dollars[2]	Current dollars	1972 dollars[2]	Current dollars	1972 dollars[2]	Current dollars	1972 dollars[2]	Current dollars	1972 dollars[2]
1960.....	8.1	14.0	1.0	1.7	1.5	2.6	3.6	6.2	2.0	3.5	6.2	10.7	0.4	0.7	1.5	2.6
1961.....	8.4	14.2	.9	1.5	1.6	2.7	3.6	6.1	2.3	3.9	6.5	11.0	.4	.7	1.5	2.5
1962.....	10.8	17.7	1.0	1.6	2.1	3.4	5.4	8.9	2.3	3.8	8.0	13.1	.7	1.2	2.1	3.4
1963.....	15.8	24.7	1.5	2.4	2.5	3.9	9.3	14.5	2.5	3.9	11.6	18.1	.8	1.3	3.4	5.3
1964.....	12.4	19.4	1.1	1.7	1.7	2.7	7.8	12.2	1.8	2.8	8.9	13.9	1.0	1.6	2.5	3.9
1965.....	12.0	18.2	1.0	1.5	1.7	2.6	7.5	11.4	1.8	2.7	8.6	13.0	1.2	1.8	2.2	3.4
1966.....	13.7	19.8	1.6	2.3	2.2	3.2	7.5	10.8	2.4	3.5	9.9	14.3	1.2	1.7	2.6	3.8
1967.....	14.1	19.4	1.8	2.5	2.6	3.6	7.7	10.6	2.0	2.7	10.1	13.9	1.2	1.6	2.8	3.9
1968.....	13.7	17.9	1.8	2.4	2.6	3.4	7.3	9.5	2.0	2.6	10.0	13.0	.8	1.1	2.9	3.8
1969.....	13.9	17.2	1.8	2.2	2.7	3.3	7.1	8.8	2.3	2.9	10.1	12.5	.9	1.1	2.9	3.6
1970.....	11.2	12.8	1.8	2.1	2.8	3.2	4.5	5.1	2.1	2.4	7.7	8.8	.7	.8	2.8	3.2
1971.....	13.7	14.6	2.0	2.1	3.6	3.8	5.8	6.2	2.3	2.5	9.3	9.9	.7	.7	3.7	4.0
1972.....	13.4	13.4	5.1	5.1	3.0	3.0	2.7	2.7	2.6	2.6	5.7	5.7	.7	.7	7.0	7.0
1973.....	15.0	14.1	4.9	4.6	4.9	4.6	2.2	2.1	3.0	2.8	5.1	4.8	.6	.6	9.3	8.7
1974.....	20.2	17.2	5.8	5.0	6.0	5.1	3.9	3.3	4.5	3.8	6.5	5.5	1.2	1.0	12.5	10.7
1975.....	24.8	19.2	11.3	8.7	6.8	5.3	4.0	3.1	2.7	2.1	5.9	4.6	.9	.7	18.0	13.9
1976.....	25.3	18.5	11.6	8.5	5.7	4.2	4.7	3.4	3.3	2.4	7.5	5.5	.8	.6	17.0	12.4
1977.....	27.0	18.5	8.8	6.0	6.8	4.7	5.9	4.0	5.5	3.8	10.8	7.4	.8	.5	15.4	10.6
1978.....	18.8	11.7	4.6	2.9	5.4	3.3	6.2	3.9	2.6	1.6	10.1	6.3	.7	.4	8.0	5.0
1979.....	24.9	14.4	8.0	4.6	6.0	3.5	7.7	4.4	3.2	1.9	12.1	7.0	.7	.4	12.1	7.0

[1]Includes Federal funds for cooperative programs and projects.
[2]Converted to 1972 dollars by dividing expenditures in current dollars by the implicit price deflators for gross national product for government purchases of goods and services as reported by the U.S. Department of Commerce.

Sources: U.S. Department of Agriculture, Forest Service, and cooperating State forestry agencies.

Table 9.8—*Reported expenditures for rural forestry assistance (service forestry) in the United States, by section and source of funds, 1950–77*

(Million dollars)

Year	United States		North		South		Rocky Mountains		Pacific Coast		Federal		State	
	Current dollars	1972 dollars[1]	Current dollars	1972 dollars[1]	Current dollars	1972 dollars[1]	Current dollars	1972 dollars[1]	Current dollars	1972 dollars[1]	Current dollars	1972 dollars[1]	Current dollars	1972 dollars[1]
1950	1.3	3.3	0.8	2.0	0.4	1.0	...	...	0.1	0.3	0.6	1.5	0.7	1.8
1951	1.5	3.3	.9	2.0	.5	1.1	...	...	.1	.2	.6	1.3	.9	2.0
1952	1.5	3.2	.9	1.9	.5	1.1	...	...	.1	.2	.5	1.1	1.0	2.1
1953	1.7	3.5	1.0	2.1	.6	1.2	...	...	.1	.2	.5	1.0	1.2	2.5
1954	1.7	3.5	1.0	2.1	.6	1.2	...	...	.1	.2	.5	1.0	1.2	2.5
1955	1.9	3.8	1.2	2.4	.6	1.2	...	...	.1	.2	.5	1.0	1.4	2.8
1956	2.0	3.8	1.2	2.3	.7	1.3	...	...	.1	.2	.6	1.1	1.4	2.7
1957	2.4	4.4	1.4	2.5	.8	1.5	0.1	0.2	.1	.2	.9	1.6	1.5	2.8
1958	3.1	5.5	1.6	2.8	1.2	2.1	.1	.2	.2	.4	1.4	2.5	1.7	3.0
1959	3.8	6.7	2.0	3.5	1.4	2.4	.2	.4	.2	.4	1.4	2.5	2.4	4.2
1960	3.9	6.7	2.0	3.5	1.5	2.6	.2	.3	.2	.3	1.4	2.4	2.5	4.3
1961	4.4	7.4	2.1	3.6	1.8	3.0	.3	.5	.2	.3	1.4	2.3	3.0	5.1
1962	5.4	8.8	2.5	4.1	2.2	3.6	.4	.6	.3	.5	2.4	3.9	3.0	4.9
1963	5.7	9.1	2.7	4.3	2.3	3.7	.4	.6	.3	.5	2.4	3.8	3.3	5.3
1964	6.4	10.0	3.0	4.7	2.6	4.1	.4	.6	.4	.6	2.4	3.8	4.0	6.2
1965	7.0	10.6	3.3	5.0	2.8	4.2	.5	.8	.4	.6	2.9	4.4	4.1	6.2
1966	7.7	11.1	3.6	5.2	3.1	4.5	.6	.8	.4	.6	3.5	5.0	4.2	6.1
1967	8.5	11.7	4.0	5.5	3.4	4.7	.7	1.0	.4	.5	3.5	4.8	5.0	6.9
1968	8.9	11.6	4.2	5.5	3.5	4.6	.8	1.0	.4	.5	3.4	4.4	5.5	7.2
1969	9.5	11.7	4.2	5.2	3.9	4.8	.9	1.1	.5	.6	3.4	4.2	6.1	7.5
1970	11.6	13.3	5.0	5.7	5.1	5.8	1.0	1.2	.5	.6	3.9	4.5	7.7	8.8
1971	13.5	14.4	5.8	6.2	5.9	6.3	1.1	1.2	.7	.7	4.6	4.9	8.9	9.5
1972	15.0	15.0	6.4	6.4	6.7	6.7	1.2	1.2	.7	.7	4.7	4.7	10.3	10.3
1973	17.1	16.0	6.6	6.2	8.4	7.9	1.2	1.1	.9	.8	4.7	4.4	12.4	11.6
1974	19.4	16.5	6.9	5.9	10.2	8.7	1.3	1.1	1.0	.8	4.7	4.0	14.7	12.5
1975	23.1	17.9	8.6	6.7	11.7	9.1	1.7	1.3	1.1	.8	5.3	4.1	17.8	13.8
1976	24.0	17.6	8.8	6.4	12.1	8.9	1.8	1.3	1.3	1.0	5.3	3.9	18.7	13.7
1977[2]	25.7	17.6	9.1	6.3	13.0	8.9	2.1	1.4	1.5	1.0	6.5	4.4	19.2	13.2

[1]Converted to 1972 dollars by dividing expenditures in current dollars by the implicit price deflators for gross national product for government purchases of goods and services as reported by the U.S. Department of Commerce.
[2]Preliminary data.

Sources: U.S. Department of Agriculture, Forest Service, and cooperating State forestry agencies.

the-ground accomplishment, and public costs per unit of output are typically lower than unit costs for timber production on public lands. Under these programs, Federal or State governments pay a portion of the cost of timber management on private ownerships.

The Forestry Incentives Program is the principal Federal cost-sharing program for timber management in current operation. Federal funding for this program has averaged $15 million per year since authorized in August 1973. Under this program, the Secretary of Agriculture is authorized to share up to 75 percent of the cost of reforestation and timber stand improvement with farmer and other private forest landowners. Several States have similar programs.

Forest Research. Supporting the treatment and assistance programs described above are programs of public and private forestry research. Forest Service and State expenditures for timber management related research have increased fairly rapidly, rising from about $13 million (1972 dollars) in 1950 to over $80 million in 1978 (table 9.9). The Forest Service and State expenditures have followed roughly parallel trends since the mid-1960's. State expenditures now compose roughly 40 percent of the total.

The State expenditures include the timber management related research carried on at State Agricultural Experiment Stations, Land Grant Colleges and other State-supported colleges and universities offering graduate training in forestry science and having a forestry school. About a quarter of the reported State expenditures is composed of Federal funds provided under the McIntire-Stennis Act.[4]

In 1975, the universities and the Forest Service devoted 1,535 Scientist Years (SY's) to forest and range land resources research. About 40 percent of this effort, 617 SY's, was designed to improve timber supply. The Forest Service accounted for 60 percent of this effort and the universities 40 percent. Three major research thrusts identified in these efforts are: (1) Improved silvicultural techniques to increase yields of timber and to assure minimal adverse environmental and esthetic impacts from timber growing and harvesting, (2) genetic improvement to provide superior tree species for greater yield and increased disease and insect resistance, and (3) work designed to reduce timber losses from destructive agents (fire, insects, diseases, etc.). This latter type of research received the most emphasis (49 perecnt), followed by silvicultural (37 percent), and genetics (13 percent). About 40 percent of the total effort was in the West, 35 percent in the South, and 25 percent in the North.

In addition to the timber management related research carried on by the Forest Service and State agencies, there

Table 9.9—*Reported Forest Service and State expenditures for timber management research in the United States, by source of funds, 1950–78*

(Million dollars)

Year	Total		Forest Service[1]		State[2]	
	Current dollars	1972 dollars[3]	Current dollars	1972 dollars[3]	Current dollars	1972 dollars[3]
1950	..	..	5	13	..	..
1951	..	..	5	11	..	..
1952	6	13	5	11	1	2
1953	6	12	5	10	1	2
1954	6	12	5	10	1	2
1955	7	14	6	12	1	2
1956	9	17	8	15	1	2
1957	11	20	10	18	1	2
1958	14	25	12	21	2	4
1959	13	22	11	19	2	3
1960	14	24	12	21	2	3
1961	18	30	14	23	4	7
1962	20	33	17	28	3	5
1963	23	37	18	29	5	8
1964	24	37	20	31	4	6
1965	26	39	22	33	4	6
1966	35	51	27	39	8	12
1967	41	57	28	39	13	18
1968	43	56	31	40	12	16
1969	50	62	32	40	18	22
1970	50	57	34	39	16	18
1971	57	60	37	39	20	21
1972	66	66	44	44	22	22
1973	75	70	49	46	26	24
1974	77	66	47	40	30	26
1975	95	74	59	46	36	28
1976	122	90	80	59	42	31
1977	116	79	69	47	47	32
1978	132	83	79	50	53	33

[1]Includes research on timber management; fire, insect, and disease protection; products utilization and engineering and resource economics. Range management research is also included for the years 1950–58.
[2]Includes research on forest production and products. The proportionately large increases between 1964 and 1966 are due to expanded authority provided by passage of the McIntyre-Stennis Act, PL 87-788, and a change in the reporting system to include expenditures by cooperating forestry schools in addition to expenditures by State agricultural experiment stations.
[3]Converted to 1972 dollars by dividing the expenditures in current dollars by the implicit price deflators for gross national product for government purchases of goods and services as reported by the U.S. Department of Commerce.

Sources: U.S. Department of Agriculture, Forest Service and Science and Education Administration.

Forest Service and State expenditures for timber management related research have increased from $13 million in 1950 to around $83 in 1978 (1972 dollars). There are additional expenditures in the private sector, chiefly by the larger forest industry companies.

[4] 76 Stat. 806, as amended; 164; S.C. 582a to 582a7.

is a significant amount of such research in the private sector, chiefly by the larger companies in the forest industries. While total research expenditures by the forest industries are reported, data on how much is spent for timber management versus manufacturing, marketing, and other purposes are not available.

There has been considerable specialization in the kinds of research carried on by the Forest Service, States, and private organizations. Research in protection, especially fire control, has been largely a Forest Service and State effort. In the case of forest genetics, tree breeding, and silvicultural techniques, the research effort has been carried on by the Forest Service, industry, and the universities. By far the largest part of the research conducted by the forest industries, and related industries that produce equipment and supplies for the forest industries, has been directed toward problems of timber utilization. Within the forest industries, the paper and allied products industry funds most of the research. The research by the forest products industry has helped it to adapt to the reduced quality of timber supplies and different species, to expand markets for pulp and reconstituted wood products, and to increase efficiency in converting timber into timber products.

Other Forestry Measures. In addition to the management, protection, assistance, and research programs described above there are a number of other activities that are related to the management of commercial timberland. For example, road construction and maintenance is an integral part of management. As indicated in table 9.1, some $388 million (current dollars) was spent on National Forest road construction and maintenance in 1978. Additional and substantial outlays for new construction and maintenance were also made on other Federal and State forest lands; on those portions of the Federal, State, and county road systems that facilitate forestry activities; and on private forest ownerships.

There are also substantial expenditures of an administrative nature by both public and private forest owners and managing agencies which have not been included because of the lack of data.

Opportunities for Achieving Further Increases in Timber Growth

It seems clear that investments in most practices and activities designed to increase timber supplies, as measured by such indices as appropriations for Forest Service programs, areas planted and seeded, areas protected from fire, and expenditures for private forestry assistance and research have been rising in the past three decades. These investments along with those in preceding decades, have presumably contributed to the large increases in net annual timber growth described above (figure 6.11). Average net annual growth per acre, however, is still far below what can be achieved through added investments in management assistance and research programs.

Thus, net annual growth can be greatly increased. However, achieving the potential will involve actions to keep commercial timberlands well stocked with desirable trees, increase tree growth, and minimize losses of timber to wildfires, diseases, insects, and other causes. Expanded technical and financial assistance to public and private commercial timberland owners and managers. will be needed. It will also be necessary to develop new knowledge through research and to expand and speed the dissemination of knowledge through educational programs.

Intensification of Timber Management. There are a number of treatment actions or management practices, such as stand regeneration, stand improvement, stand conversion, improved harvest scheduling, and better protection from destructive agents which can be used to more fully realize the potential of the Nation's forests. Use of any one or combination of these actions must be evaluated in view of the particular conditions of the timber stands and ownership objectives. There are no blanket prescriptions that apply nationwide. However, all of the possible management practices have some application in some forest types on all ownerships and in all regions.

Regeneration.—A major determinant of timber growth is the area of commercial timberland. As shown above, a slow decrease in the Nation's commercial timberland base can be expected in the future. Therefore, if timber growth is to be maintained and increased, timberlands must be adequately regenerated to desirable species following harvest.[5,6] In addition, those timberlands that are now inadequately stocked with desirable trees or nonstocked must be regenerated if they are to contribute in line with their potential.

For various reasons, regeneration following logging is usually slow and inadequate. Delays in regeneration to softwoods after logging are commonly as long as 3 to 5 years in the South and 5 to 10 years in the West. This represents a substantial reduction in growth potential. For example, a loss of 5 years in regenerating southern pines that are to be grown to a 50-year rotation is the equivalent of a 10-percent reduction in growth or in the area available for timber growth.

Many National Forest management plans, and particularly those in the West, include contingency provisions for planting trees as a remedial measure 5 to 10 years after logging.[7] Nonetheless, in 1978 there were 565,000 acres of National Forest lands in the West that had been logged and needed reforesting with suitable softwoods.

Lack of adequate regeneration to desired species has also resulted in changes in forest types. For example, in the South, during the last decade or so, the area in the southern pine types and the oak-pine type has been declining while the area in the oak-hickory type has been increasing (see preceding discussion on pages 178 to 179). Partly in response to this, there have been increases in recent years in investments in site preparation and regeneration of pine stands to pine. But these efforts, mostly on forest industry lands, are small relative to the need and the area of pine forest that was established on retired cropland in the South in earlier decades.[8,9]

Assuring rapid regeneration of logged commercial timberlands to desirable species often requires practices other than tree planting or in addition to tree planting. Site preparation, both prior to and after logging, control of unwanted brush or trees that prevent regeneration of desired species, disposal of logging slash, and prevention of wildfire and disease or insect outbreaks may be necessary in various combinations to get successful regeneration of natural or planted seedlings.

Inadequate control of brush and unwanted tree species limits regeneration of highly productive lands to desir-

[5] Boyce, Stephen G. How to double the harvest of loblolly and slash pine timber. J. Forestry 73:761–766. 1975.

[6] Schubert, Gilbert H. Silvicultural practices for intensified forest management. *In* Trees—the renewable resource. Proc. Rocky Mountain Forest Ind. Conf. (Tucson, Ariz., March, 1976). p. 37–54. 1975.

[7] Schubert. *Op. cit.*

[8] McElveen, Jackson V. Family farms in a changing economy. U.S. Dep. Agric., Agric. Res. Serv., Agric. Inf. Bull. 171, 94 p. 1957.

[9] Boyce. *Op. cit.*

able species. This is especially true in the humid coastal forests of the Pacific Northwest and southeastern Alaska, but it is also true on much of the most productive lands in the South and North. The most typical problem is failure of Douglas-fir, southern pine, or other softwoods to regenerate because of rapid growth of competing hardwood brush or trees.

This can also be a problem where unwanted hardwoods crowd out desirable hardwood species. Control of brush with herbicides and/or controlled burning is practical, and economical in many areas, but this poses various environmental problems that must be mitigated and balanced against the need for increasing softwood timber supplies.

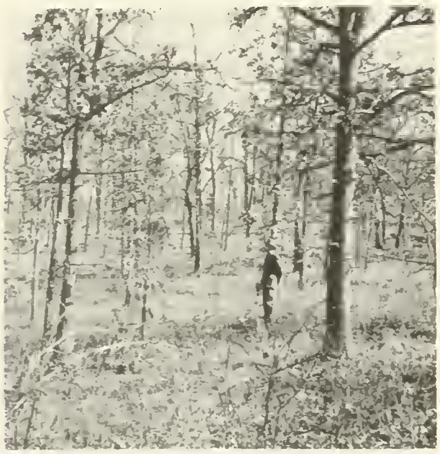
In contrast to softwoods, hardwoods usually regenerate rapidly and easily, mostly from stump and seedling sprouts.[10,11,12] In much of the East, hardwood stands were heavily logged between 1880 and 1920. Evidence from research indicates that most of these stands naturally regenerated to another stand that was similar to the one removed.

For some purposes, it may be sufficient just to regenerate hardwood stands to the present species mix. If some other mix is desired, various treatments such as site preparation or the use of herbicides may be necessary. In general, the regeneration of hardwood stands with desired species requires (1) openings or cuts large enough for new sprouts and seedlings to make rapid growth and (2) full utilization of all woody material. Leaves and small branches which contain reatively high proportions of nutrients should be left on the logged areas.[13]

There are opportunities for regenerating land that is not now stocked with trees. As of 1977, some 11.6 million acres in the East and 6.4 million acres in the West were reported as nonstocked, i.e., commercial timberland less than 10 percent stocked with trees meeting the specification for growing stock. Much of this area is on dry sites in the Rocky Mountains, the deep sands of the South, the poor ridgetops of the Appalachians, and the sand plains and wet areas of the Lake States.

Only a small part of the nonstocked land has been recently logged. Much of the area in this classification has remained in the nonstocked category for long periods of time. Generally such areas are on poor sites in the locations listed above and offer only limited opportunities for increasing timber growth.

Some lands are classified as nonstocked which in fact are stocked, in whole or in part, with trees that do not meet the specifications for growing stock. For example, on the ridgetops in the southern Appalachians, many stands of chestnut oak are considered nonstocked because less than 10 percent of the trees can grow into commercially usable products. These stands do produce small amounts of timber. However, the sites are so poor that attempts to manage and/or regenerate these stands to more desirable species would result in very little increase in net annual growth.



Some lands classified as nonstocked or poorly stocked are on the ridges in the Appalachians and Ozarks. In general, these sites are so poor that attempts to manage and/or regenerate them would result in only limited increases in net annual growth.

Although the greater part of the nonstocked land is in the lower productivity classes—59 percent of the nonstocked land in the East is in the 20- to 50-cubic-foot class—there are important exceptions (Append. 3, table 5). For example, in the Douglas-fir subregion of western Oregon and western Washington more than 72 percent of the nonstocked commercial timberland is in the high productivity classes—85 to 120 and 120+. In other regions, the proportion in these productivity classes is much lower, but there are opportunities in all regions for regeneration of nonstocked lands where the impact on future timber supplies would be significant.

On the more productive nonstocked lands, some treatment, such as elimination of brush together with planting of seedlings, will usually be necessary to get adequate regeneration. On other sites, the lack of stocking is often the result of site deterioration as a result of past burning or exposure to extreme microclimatic condition. Intensive treatment may be required on these sites to secure restocking and growth at even a minimum level.

Planting logged or other open land offers an opportunity to use genetically improved planting stock. The possible increase in timber production per unit of area planted with genetically improved softwoods is high. For example, on the average, the volume growth from southern pine pulpwood plantations using unimproved seedlings is less than 100 to 125 cubic feet mean annual increment. When genetically improved seedlings are used and appropriate cultural practices are applied, higher yields may be obtained.[14] In the Douglas-fir type, where rotations are much longer, growth increases over random planting stock of 5 to 15 percent are now commonly being obtained with first generation genetically improved seedlings.[15]

In the western pine type with the wide range of planting sites and the slow growth of the native species, gains have been limited to 5 to 10 percent.[16]

In addition to increased growth, genetically improved seedlings are being developed with a higher inherent disease resistance. This is of major importance in the South, where fusiform rust restricts and limits pine production. As much as 20 to 75 percent of planted unimproved slash pine and 20 percent of loblolly pine have been destroyed or damaged by this native disease. The current use of disease-resistant seedlings has reduced these losses to 8 percent with slash pine and 3 percent with loblolly pine (see footnote 14). With care, disease-resistant seedlings can be used to extend the commercial range of

[10] Roach, Benjamin A., and Samuel F. Gingrich. Even-aged silviculture for upland central hardwoods. U.S. Dep. Agric., Forest Serv., Agric. Handb. 355, Washington, D.C. 39 p. 1968.

[11] Sander, Ivan L. Size of oak advance reproduction: Key to growth following harvest cutting. U.S. Dep. Agric., Forest Serv., Res. Pap. NC-79, North Central Forest Exp. Sta., St. Paul, Minn. 6 p. 1972.

[12] Johnson, Paul S. Predicting oak stump sprouting and sprout development in the Missouri Ozarks. U.S. Dep. Agric., Forest Serv., Res. Pap. NC-149, North Central Forest Exp. Sta., St. Paul, Minn. 11 p. 1977.

[13] Roach and Gingrich. 1968, *Op. cit.*

[14] Dorman, K. W., The genetics and breeding of southern pines. U.S. Dep. Agric., Forest Serv., Agric. Handb. 471, 407 p. 1976.

[15] Silen, R. R., Genetics of Douglas-fir. U.S. Dep. Agric., Forest Serv., Res. Pap., WO-35, 34 p. 1978.

[16] Wang, Chi-Wu, Genetics of ponderosa pines. U.S. Dep. Agric., Forest Serv., Res. Pap. WO-34, 24 p. 1977.

both loblolly and slash pine. Planting sites once marginal by the presence of fusiform rust can now be made productive. Similarly sites made unproductive by the presence of the disease blister rust, in the West, are being placed back into timber production using disease-resistant white pine. Such is the case with both western white pine and sugar pine in California, Oregon, Washington and Idaho.[17]

Avoiding losses in productive capacity as a result of logging can also improve future timber supply opportunities. Generally, logging practices should be chosen to minimize soil disturbances and to retain nutrient-rich materials, such as small branches and leaves, on the logged area. The maintenance of site quality is becoming a major consideration in areas where site preparation, mechanical disturbance of the surface soils, and removal of small branches and leaves are common.

At present, little is known about how much these actions affect site quality over a rotation period. However, the effects of soil compaction on securing adequate regeneration are readily apparent. While exposure of mineral soil may be necessary for successful regeneration from seed of some species, encrusting of surface layers of soil and puddling as a result of soil compaction severely limit germination and subsequent growth.

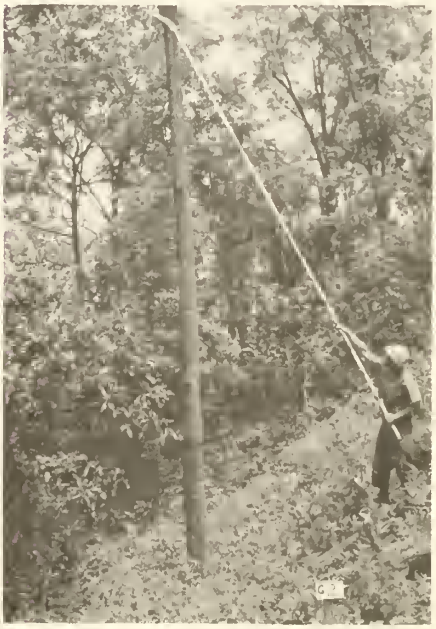
Intermediate stand treatments.— Management practices used during the period between regeneration and harvest cuts can increase timber supplies by changing the composition of stands in favor of desirable species, reducing the number of defective trees, increasing growth on favored residual trees, and releasing desirable seedlings on recently regenerated areas. In addition, fertilizing stands and draining areas where excess moisture slows growth can increase growth rates.

The most widespread intermediate treatment is thinning stands to remove low-value timber, to speed growth on desirable species and trees, and to shorten timber rotations by concentrating growth on residual trees. In some cases, this is achieved by removal of cull or low-grade timber to provide more growing space for desirable trees and is generally known as weeding. In other cases, thinning removes merchantable timber in crowded stands to avoid growth stagnation and to concentrate growth on the most valuable stems. While weeding usually does not provide a marketable product, and must be viewed as an investment in future growth, commercial thinnings produce marketable products that often cover the cost of the thinning.

The overall effect of thinning is to increase the growth of residual trees and the unit value of the products produced. It frequently leads to some reduction in the rate of accumulation of wood volume. The tradeoff, thus, is between emphasizing total volume growth and increasing the rate of growth in value of the timber stand. Thinning for timber production purposes also affects both wildlife and esthetic values by maintaining relatively open stands of timber and encouraging growth on the largest trees.

Quality improvement in future stands should also be a consideration in thinning. Early removal of low-quality trees not only concentrates growth on higher quality trees but also tends to improve desirable genetic characteristics in following stands established from seed trees.

Pruning the lower branches on young trees that are expected to be part of the final crop will also increase the quality and value of timber growth. Although pruning has little effect on overall timber supplies, it can increase supplies of high-quality timber. Over all, pruning has not been widely used in the past and, to have a substantial impact in the future, its use would have to be greatly increased.



Pruning the lower branches of crop trees has not been widely practiced. It can, however, increase the supplies of high-quality timber and returns to forest landowners.

Fertilization of forests can increase timber supplies where experience and research show that lack of soil nutrients is limiting plant growth. The biggest opportunities seem to be on the nitrogen-deficient soils of the Douglas-fir region and the poorly drained phosphorus- and nitrogen-deficient soils of the Coastal Plains of the South.[18] In the Douglas-fir region addition of nitrogen fertilizer typically increases net growth from 200 to 800 cubic feet over a 10-year period. The use of phosphorus fertilizers in newly planted pine forests on poorly drained sites on the southern Coastal Plain is generally expected to increase yields in 25-year-old stands by around 15 cords. The use of nitrogen fertilizer in these stands when they are from 10 to 25 years old also increases harvest yields in a substantial way.

Although the use of fertilizers on commercial timberlands outside the Coastal Plain of the South and the Douglas-fir region has so far been limited, there are undoubtedly opportunities in other regions. There are also some specialized uses. For example, research has shown that with fertilization black cherry seedlings and sprouts can, in one season, outgrow the reach of browsing deer.

Selective conversion of some stands and sites.—The productivity of timber stands depends both on the character of the sites and on the species in the stands. For one reason or another, many sites are carrying species of lower value or growth potential than the site can support. This may have occurred because of past land uses or harvesting practices, inadequate regeneration after harvest, storms, floods, or insect and disease damage. Where feasible, actions to convert the present species to species that are better adapted to the environment of each site will increase future timber supplies.

Some land areas such as the bogs in the eastern United States, the ridgetops of the Appalachians and some of the brushlands in the Pacific Northwest can be changed to productive sites by drainage, the addition of selected kinds of fertilizers, and by irrigation. The extent of opportunities to change productivity by changing the site characteris-

[17] Bingham, R. I., Hoff, R. J. and Steinhoff, R. J., Genetics of western white pine. U.S. Dep. Agric., Forest Serv., Res. Pap., WO-12, 18 p. 1972. Kinloch, B. B., Jr., White pine blister rust: simply inherited resistance in sugar pine. Science 167 (3915) 193–195. 1970.

[18] Bengtson, George W. *Op. cit.*

tics is not well defined. However, taking advantage of the better opportunities could increase the commercial timber base to some extent.

As described in a following section there are large opportunities for converting stands from low productivity to high productivity through a combination of practices including removal of undesired trees, planting or seeding to desired species, and control of unwanted brush or other competing growth. Species conversion has been a common practice in the South, especially on pine lands in forest industry ownerships that have been taken over by hardwoods. Converting such lands back to pine, especially where hardwood growth is slow, can significantly increase future softwood timber supplies. Most of the Coastal Plain and Piedmont regions of the South, with exception of the deep bottomlands, will grow larger volumes of pine than of hardwood timber.

Similar opportunities for species conversion are available in other regions, especially in coastal portions of the Pacific Northwest where alder and maple have replaced the original softwood forests. In addition, conversion of very productive lands along flood plains from brush and willows to fast-growing cottonwood plantations is an attractive opportunity for increasing pulpwood supplies. Such land is limited, however, to relatively small areas, nearly all along the major rivers in the South.

In some sections, and especially in the lodgepole pine types of the Rocky Mountains, there are substantial areas of stagnated stands. Removal of the present stands and replacement with properly spaced new stands of the same or different species is the only way to achieve the growth potential of such areas. Such conversion, however, may be limited by low sites or because of wildlife or other nontimber considerations.

Improved scheduling of timber harvest.—The largest total annual yields of timber are obtained when stands are harvested at the age where net annual growth is maximized (culmination of mean annual increment). This age is known for most forest types in the United States. Thus, careful scheduling of the age of harvest can affect overall timber production on millions of acres of land. For example, the harvest of upland hardwood forests at 50 years of age provides the largest total annual cubic volume of timber. Harvest at ages necessary for producing large-size high-quality sawtimber will reduce the average annual yields of timber.[19]

Many farmer and other private owners, especially in the eastern United States, keep timber stands beyond the age of culmination of mean annual increment. A significant increase in timber supplies could be achieved by harvesting these stands when the overall average annual growth begins to decline, as long as harvesting is followed by adequate regeneration. Thus, one of the important opportunities to increase timber production on the farmer and other private ownerships is to aid the owner in scheduling the harvest of stands and assuring the rapid regeneration of the area to fast-growing species.

The quality of timber produced is also related to the age of timber stands. While total volume is maximized by logging and regenerating stands at the age of culmination of mean annual increment, the quality and average value of trees may be increasing rapidly well beyond this point. This is particularly true for high-value timber such as black cherry and walnut, where large trees bring premium prices. Thus, for many species, maximizing the value or quality of annual growth will generally mean holding timber stands beyond the age at which average annual volume growth is maximized. For other species and for uses where quality is not an important factor, economic returns may be maximized by harvesting before the age where net annual growth is greatest.

Accelerated harvest of old-growth timber on Federal lands in the West.—As indicated in the discussion of timber ownership presented above, the bulk of the remaining old-growth softwood timber in the West is on National Forests and on the Oregon and California (O&C) lands in Oregon, which are managed by the Bureau of Land Management. The general policy on the National Forests has been the sale of timber to a quantity equal to or less than that which can be removed from each Forest annually in perpetuity on a sustained yield basis. This assures that timber from second-growth stands will be available to provide a relatively even flow of timber from National Forest lands in the future.

The President has directed the Department of Agriculture, consistent with existing legal requirements, to use maximum speed in updating land management plans on selected National Forests with the objective of increasing the harvest of mature timber through departure from the above policy taking into account relevant economic and environmental implications. This could temporarily increase the volume of timber available for industry. This course, which has been supported by some members of the timber industries, some dependent communities and other associated interests, could offset for a time at least part of the expected decline in the harvest of timber from forest industry ownerships in the Pacific Northwest. However, harvests above the even flow level could not be maintained and the dependent industries and communities would sooner or later be faced with a drop in harvests. For this and other reasons, chiefly the impacts on the natural environment, harvest above even flow levels has been strongly opposed by environmental and preservation groups and many other nontimber groups interested in the management and use of the Federal timberlands.

Reduction of losses.—The growth of timber can be reduced by poor harvesting practices, wildfire, insects, diseases, and natural mortality. Management practices that reduce losses from these causes and result in rapid salvage of dead and dying timber can add in a substantial way to net annual growth and the volume of timber available for use.

Harvesting activities often damage residual trees and may increase the risk of insect attacks, windthrow, and fire on adjacent timber stands. Improvements in logging practices to minimize damage and the use of silvicultural methods to protect residual trees against destructive agents such as wind, insects, and disease could significantly reduce the mortality and growth loss associated with harvesting.

The largest and most effective management effort in the United States has been in control of forest fires. The results have been remarkable, with a decline in area burned from 30 to 40 million acres annually at the beginning of the century to about 5 million acres annually in the mid-1970's. The improvement in protection has contributed in a major way to the increases in net annual growth and timber inventories which have been taking place in eastern forests in recent decades.

Despite the progress that has been made, there appear to be opportunities to further reduce fire losses and costs through development and use of improved technology in fire prevention, detection, resuppression, suppression,

[19] Schnur, G. Luther. Yield, stand and volume tables for even-aged upland oak forests. U.S. Dep. Agric., Tech. Bull. 560. Washington, D.C., 87 p. 1937.

and fuels management. These opportunities include better understanding of ways to prevent fires, improving detection systems, and development of techniques for more effective control of fires. Improved suppression systems, particularly on large fires that characteristically result in greatest fire damage, could also reduce losses.

Harvesting in many areas normally results in a temporary buildup in the volume of tops, limbs, and other similar residues on the forest floor. In addition, the effectiveness of forest fire control programs in recent years has led generally to buildup in understory brush and other flammable material in many parts of the country. Fire losses could be cut by reducing fuel accumulation on harvested areas through the development of ways of using residues and/or improved cleanup of the harvested areas. Improvements in techniques of using prescribed fire to reduce the buildup of flammable debris and litter also could lower the intensity of wildfires and the associated losses. There is a related need for research on ways of dispersing and minimizing smoke from prescribed fires to meet acceptable air quality standards.

Insects and diseases take a heavy toll of timber by killing trees and by reducing timber growth. A few major pests such as the western bark beetles, southern pine beetle, and root rots account for most of the mortality. Other insects and diseases such as spruce budworms, dwarf mistletoes, and gypsy moth cause serious but less spectacular damage by killing shoots and terminals, reducing the rate of growth, or by stunting, deforming, or degrading the value of trees and wood products.

The use of integrated pest management systems against the major forest pests offers the potential to increase or extend the timber supply in an environmentally acceptable manner. Elements of management systems that could reduce insect- and disease-caused losses include: (1) Silvicultural techniques that encourage more pest-resistant stands; (2) improved methods of pest control with biological control agents;[20] (3) selective chemicals including pesticides which are safe and environmentally acceptable; and (4) stand hazard-rating systems that identify pest-susceptible trees and stands.

Rapid salvaging of dead or damaged timber following wildfires, insect and disease outbreaks, and windstorms can also reduce losses of timber. The effective salvage efforts following the 1962 Columbus Day storm in Oregon illustrate the potential for salvage when large volumes of timber are involved. The major part of the losses to destructive agents will continue to be the day-to-day losses of individual or small groups of trees. The development of lower cost harvesting methods and equipment could facilitate the salvage of part of this material.

Nearly all commercial timberland is used to some extent for purposes such as outdoor recreation, range grazing, wildlife habitat and as a source of water. Most of these conflict in some degree with the use of the land for timber production. Reduction in timber supplies can be minimized in large part by management practices that harmonize timber production with other uses.[21] Further, on much of the land that is not managed for specific purposes, planned management can increase the output of most or all products including timber.

Development of New Knowledge. Much can be done to increase timber growth and improve timber quality along the lines described above with existing technology. Basic knowledge on how timber grows under various conditions and in response to management practices has greatly expanded in recent decades. However, much remains to be done. Achieving more and more of the potential of the Nation's commercial timberlands and improving the effectiveness of investments in management practices will require a greatly expanded technological base.

For example, additional knowledge is needed to help forest managers make better decisions on using available land effectively and to help executives and legislators allocate program resources efficiently among the various alternatives. More specifically, forest managers need better information on how to regenerate desired timber stands, on silvicultural methods that are best suited to the production of particular products, and on the relationship between the production of timber and other goods and services from the forest. Better information is also needed on the commercial timberland base and on the relative effectiveness of various programs to which resources are allocated.

Research can reduce the time and cost involved in reforesting timber stands with desired species. Evidence from all parts of the Nation indicates major failures in the regeneration of harvested areas to desired species. Regeneration following harvesting is often delayed because reliance is placed on natural regeneration rather than making the necessary investments in site preparation and seeding or planting that would insure immediate regeneration. Research to significantly reduce the cost of these practices could shorten the time between harvests of successive stands.

The further development of seedlings with superior genetic composition, improvements in the use of containerized seedlings, inoculation with appropriate strains of mycorrhizal fungi, and physiologically preconditioning seedlings to planting sites could increase future timber supplies. However, research is needed if these techniques are to be available at low costs.

Most regeneration following harvesting is natural and does not involve site preparation and planting. However, there has been a decline in the amount of research being done on natural regeneration in the past 20 years because efforts were being directed at increasing yields by intensive cultural practices. It is important that increased research efforts now be devoted to low-cost, effective methods of natural regeneration in combination with timber harvesting since this will be the major means of regeneration for many years to come and especially on the farmer and other privately-owned lands. For example, the development of new or modified harvesting procedures and equipment may be the least costly way to quickly obtain natural regeneration and improve the efficiency of natural seeding. New research efforts are also needed on genetic improvement of forest stands that are naturally regenerated and direct seeded.

Further quantifications of the physical responses of the forest to management activities is another important research need. Considerable research has been conducted on stand responses to some management practices, such as commercial thinning of even-aged softwoods and cull removal in hardwoods. However, relatively little has been done on other practices such as precommercial thinning in softwood stands or on

[20] U.S. Department of Agriculture in cooperation with the Land Grant Universities, State Departments of Agriculture and the Agriculture and the Agriculture Research Institute. Biological agents for pest control—status and prospects. Govt. Print. Off., Washington, D.C., 130 p. 1978.

Baker, Kenneth F. and R. James Cook. Biological control of plant pathogens. W. H. Freeman and Co., San Francisco, 433 p. 1974.

[21] Biesterfeldt, Robert C., and Stephen G. Boyce. Systematic approach to multiple-use management J. Forestry 76(6):342–345. 1978.

the response of planted trees to site preparation. The response of loblolly pine, slash pine, and Douglas-fir to fertilizer on certain sites has been analyzed, but similar analyses are needed for other species and sites. Yield increases resulting from first-generation genetically improved stock in young stands of slash and loblolly pine are fairly well documented on some sites and preliminary estimates are available for Douglas-fir, but similar information is lacking for most other species.

Most of the existing yield data are applicable only to certain forest types and to limited areas. Information is needed to permit extrapolation of growth and yield responses to management of large geographic areas such as States and regions, and for minor, as well as major, forest types.

While studies to develop timber growth and yield response information require a long time, this information is essential for analyses of prospective timber supplies, timber investment programs, and allowable harvest levels. Systematic efforts should be made to assemble the best information currently available and to add new knowledge to fill in gaps.

In addition to the need for data on timber responses to management, there is a need for data on the effects of various management practices on the production of other products such as wildlife, forage, and water. Simple relationships must be developed to show the impacts on the outputs of these products from various management practices and combinations of these practices. These relationships can be developed independently by various disciplinary areas and then combined to make a dynamic analysis of rates of timber harvest and size of stands created.[22,23] This kind of information will become increasingly important as more and more of the Nation's commercial timberland is managed for muliple purposes.

In the face of increasing concern over the environmental and biological effects of the use of chemical pesticides, an important research opportunity in pest control is to find ways to incorporate preventive measures for insects, diseases, and fire into silvicultural programs. Considerable basic research is necessary to solve applied problems for pest management. Research must deal with the behavior of trees, animals, and organisms in the forest in relation to sites, genotypes, insects, diseases, fire, and climate. For example, cultural actions could be tailored to recognize differences among genotypes; preliminary information indicates that responses of the various genotypes will differ in relation to use of fertilizer, kinds of thinning, and pest management practices. This kind of research is especially important as work continues to develop trees resistant to such pests as white pine blister rust.

The growing interest in wood as a major source of energy suggests the need for research related to efficient methods of growing and harvesting large volumes of wood, including small material usually left in the woods. Of particular importance are the possible impacts of utilizing most of the wood fiber from an area on soils and nutrient balances. Some proposals for use of wood in energy production suggest that for the first time, complete utilization of trees may become economically feasible. Whether or not this actually occurs, research into the long-range implications of almost total removal of wood from commercial timberland is necessary. Information is also needed, on ways to integrate production of wood fiber or or biomass for energy production with the production of timber for industrial timber products such as sawlogs, veneer logs, and pulpwood.

Other aspects of changing utilization standards also deserve attention in research programs. For example, managing forest stands to reduce variation in the size and character of timber to improve efficiency in handling and to maximize the output of usable wood material could result in substantial benefits to timber producers, processors, and consumers.

Better information on markets for timber and on the economics of managing timber in conjunction with other forest resources on small ownerships could lead to significant increases in timber supplies. The typical small owner lacks reliable current information on timber prices, availability of markets and the economic efficiency of alternative management and harvesting practices.

Better information on timber markets would make it possible for small woodland owners to time their timber sales more effectively and increase income from timber harvesting. Further increased economic returns from timber harvesting would encourage owners to seek more rapid regeneration and to use silvicultural practices that will utilize commercial timberland more effectively.

For many small owners, timber harvesting conflicts in varying degrees with the use of the forest for other purposes. Market information and technical assistance on the preparation of timber sales could reduce the perceived conflicts in goals and add to available timber supplies. Supervision of logging to insure proper practice is a critical factor in minimizing harvesting impacts.

Better market information would also be useful in increasing timber supplies from ownerships in more densely populated areas. Small ownerships of 10 to 30 acres in urban and suburban areas include some highly productive lands that grow large amounts of wood. Better techniques for the removal of this timber and the regeneration of the stands in ways that are compatible with the other objectives of owners could make more wood available for use especially in the East. There is a related need for the development of ways to harvest and concentrate logs from small ownerships in most parts of the country including those cut in urban areas. An effective research and development effort could result in a significant contribution toward better management and use of small forest ownerships and urban and suburban trees.

In addition to market information, there is a need for current and detailed information on the timber resource which will provide a basis for judging the progress and results of timber management programs and for appraising the opportunities for investments in timber management programs and timber product manufacturing facilities. As indicated by the information in Chapter 6 and Appendix 3, a substantial body of such data has been collected as a part of the nationwide Forest Survey.[24]

There is, however, a need to accelerate and intensify the surveys of timber resources; the present time between successive surveys of each State averages 12 years. This is far too long to adequately monitor the changes taking place in timber resources. In some States where there has been rapid indus-

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[22] Boyce, Stephen G. Management of eastern hardwood forests for multiple benefits (DYNAST-MB). U.S. Dep. Agric., Forest Serv., Res. Pap. SE-168, Southeastern Forest Exp. Sta., Asheville, N.C., 116 p. 1977.

[23] Boyce, Stephen G. Management of forest for timber and related benefits (DYNAST-TM). U.S. Dep. Agric., Forest Serv., Res. Pap. SE-184. Southeastern Forest Exp. Sta., Asheville, N.C., 140 p. 1978.

[24] As authorized by section 9 of the McSweeney-McNary Forest Research Act of 1928 as amended by the Forest and Rangeland Renewable Resources Planning Act of 1974 and the Forest and Rangeland Renewable Research Act of 1978.

There is a need to accelerate and intensify surveys of the timber resource to provide a basis for judging the progress and results of timber management programs and for appraising the opportunities for investments in timber management and timber manufacturing facilities.

trial development, timber removals have changed by as much as 40 percent in a 10-year period. In other areas such as the Delta region of Arkansas, Louisiana, and Mississippi, commercial timberland clearing has been averaging more than 300,000 acres a year. Obviously, in areas where such fast changes are taking place, inventory cycles of more than 5 years are of limited usefulness in guiding resource planning and management.

The Forest Survey should also be intensified to provide more precise local resource data. Present sampling standards are designed to achieve acceptable sampling errors for large areas of forest land (1 million acres) or for relatively large timber volumes (1 billion cubic feet of timber). This limits the usefulness of the data for local governments, planning agencies, and resource industries that may need statistically reliable information for relatively small geographic areas. Intensification of the inventories to provide this information would greatly facilitate local land use planning and management of forest lands including those in small private ownerships.

Speeding the Use of New Knowledge. There is an inevitable lag between the time new knowledge is developed and its widespread acceptance and application. Shortening the time lag is possible and would, to the extent that new knowledge can contribute, increase timber supplies.

The lag in the transfer of basic research into practice reflects in part the research process. Most basic research is carried out by people not directly concerned with translating results into practice. Usually the basic research must be presented in a different form, one that can be understood and used by forest owners and managers.

The transfer of research into practice in the Forest Service and most forest industry firms can be relatively rapid. Forest lands are available for immediate testing of new techniques and internal communication channels are well established. Unified direction also facilitates the use of research results.

There is, however, a substantial problem in transferring results from government or forest industry research programs into meaningful terms for farmer and other private owners. In part, this reflects a simple difference in scale: what is feasible and desirable on large public or industrial holdings may appear impractical to the small landowner. In part, it is also a matter of understanding: what seems obvious to a well trained forest manager may be confusing to the landowner whose major interests are elsewhere. Clearly, efforts to transfer and increase the use of research need to be expanded.

Successful demonstrations on experimental forests appear to be the most effective means of encouraging the adoption of research results. More of these are needed. However, such passive approaches must be accompanied by direct technical and financial assistance to farmers and other private owners whose properties can serve, in turn, as demonstrations for neighbors. Adoption of successful management techniques by some owners has undoubtedly been the major incentive in the past for others to adopt similar techniques. Government or industry technical and financial programs in each locale should be aimed at leaders and innovators who will provide examples likely to be followed by other landowners.

There are economic opportunities to increase timber supplies on more than a third of the Nation's commercial timberland area. About three-quarters of these opportunities involve reforestation or stand conversion.

It is difficult to measure the effectiveness of past assistance programs in increasing timber supplies. It is obvious, however, that the potential for increased timber supplies from farmer and other private ownerships is great and that adequate assistance programs could have large impacts.

Economic Opportunities for Increasing Timber Supplies

When all things are taken together, it is apparent that there are large biological opportunities for increasing timber supplies. Given anticipated changes in management costs and stumpage prices, only part of these opportunities can be expected to yield an acceptable rate of return on the investments required to put the opportunities into practice. However, the management opportunities for increasing timber supplies that would yield 4 percent or more on the investment measured in constant 1977 dollars (net of inflation or deflation) are large and if carried out would in time increase net annual timber growth in a major way.

A study [25] of these economic op-

[25] The analysis of economic opportunities for management intensification summarized here is based on a detailed study by George F. Dutrow, Joseph M. Vasievich, and Merle E. Conkin. Economic opportunities for increasing timber supplies in the United States. U.S. Department of Agriculture, Forest Service, and Forest Industries Council. [In process.] In this study, over 400 university, industry, and government foresters in 7 timber supply regions and 25 individual States selected what they considered significant economic opportunities to increase timber supplies through intensified forest management. Although management opportunities were chosen on the basis of augmenting timber supplies, the forestry experts made their selections with three general constraints in mind: management actions had to be environmentally acceptable, financially sound and incremental to efforts already scheduled or planned. In preparing the estimates of economic opportunities, these experts prescribed specific treatments for existing conditions on commercial timberlands, assigned probable costs of application, estimated increases in timber yields for each treatment, and outlined existing ranges of stumpage values. Resource analysts in the Forest Service added acreage estimates for each identified forest condition in the 25 major timber-producing States. Over 200 investment opportunities were identified. These opportunities varied by site, physiographic region, and managerial action, and were consolidated into the two major types of management opportunities used in this study—reforestation/conversion and

portunities—those that would yield 4 percent or more—shows that the potential exists for intensifying management on 168 million acres of commercial timberland, some 35 percent of the Nation's total (table 9.10). With treatment of these acres, net annual timber growth could be increased by 12.9 billion cubic feet, a volume equal the total timber harvest in 1976 and to three-fifths of the total net annual growth. Achieving this growth would take time since it would require several decades for the effects of investments in the economic opportunities to be realized. Furthermore, substantial capital, $15.1 billion, would be required to do the job on all identified acres.

About three-quarters of the economic treatment opportunities on an area basis involve reforestation or type conversion of existing stands. This category includes regeneration of nonstocked acres, harvesting mature stands and regenerating the tract, and conversion of existing stands to more desired species. Treatments of these reforestation/conversion opportunities would require an investment of $13.5 billion and increase net annual timber by 11.6 billion cubic feet.

A majority of the opportunities for increasing timber supplies, 74 percent, are on farmer and other private ownerships which collectively contain about 58 percent of the commercial timberland (fig 9.3). A $10.6 billion investment in these ownerships would raise net annual growth of timber by over 9 billion cubic feet. Most of the remaining opportunities are on the 14 percent of commercial timberland in forest industry ownerships. All economic opportunities on the National Forests are currently scheduled or planned and are not included in table 9.10.[26]

As illustrated in table 9.10 and figure 9.4, there are economic opportunities for increasing timber supplies in all regions. The size and kinds of opportunities vary, however, because of differences in the productivity of commercial timberland, management costs, and stumpage prices.

Economic Opportunities for Increasing Timber Supplies in the Northeast. In the Northeast, net annual timber growth could be increased by almost 0.5 billion cubic feet if all economic opportunities were exploited. Realization of this potential would require investments of $620 million on 16.3 million acres.

In terms of area, a little over half of the economic opportunities for increasing timber supplies in the Northeast is on oak-hickory stands, the dominant forest type in the region (table 9.11). Implementation of these opportunities, thinning and timber stand improvement to achieve better stocking with desired species and trees, would increase net annual growth by 193 million cubic feet, nearly half of the potential in the Northeast. There are also substantial opportunities on maple-beech-birch stands, some 3 million acres in terms of area. If all the economic opportunities on hardwood stands were put into practice, net annual hardwood growth in the Northeast would be increased by 293 million cubic feet, about 14 percent of the net annual hardwood growth in the region in 1976.

In the softwood stands of the Northeast, the largest economic opportunity is release of some 3 million acres of spruce-fir seedling and sapling stands. There are also economic opportunities for stocking control on another 2 million acres of softwoods, mostly on pine stands. If all economic opportunities were implemented, net annual softwood growth in the Northeast could be increased by about 138 million cubic feet. This is equal to about 13 percent of the net annual softwood growth in 1976.

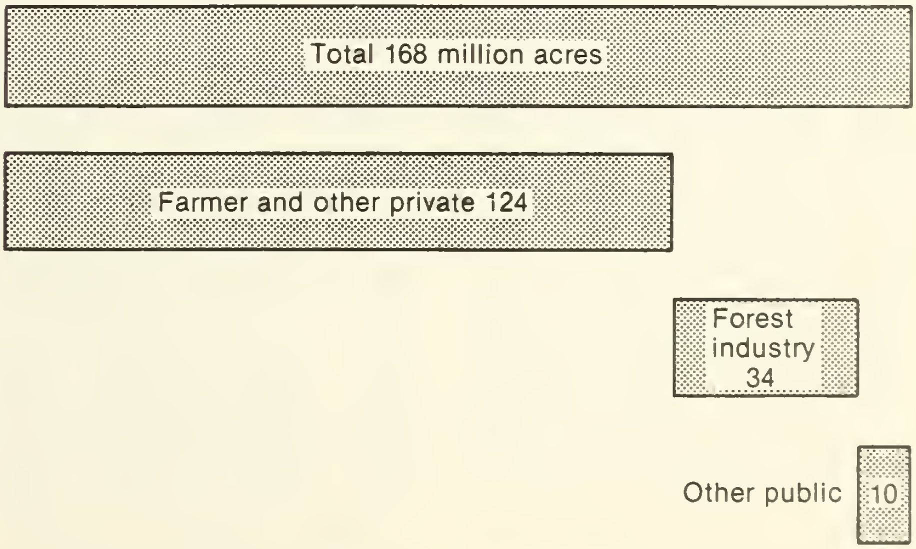
The economic opportunities to reforest or convert acres to more desirable species are limited in the Northeast. Although 11 million acres were initially identified as needing these treatments, the prospective returns on the required investments were below 4 percent. Relatively small changes in costs and stumpage price could raise the rate of return above 4 percent and increase timber growth by as much as an additional half a billion cubic feet annually.

About three-quarters of the area on which economic opportunities exist is in farmer and other private ownerships; nearly all of the remainder is in forest industry ownerships.

Economic Opportunities for Increasing Timber Supplies in the North Central Region. There are economic opportunities for increasing timber supplies on 18.5 million acres in the North Central region (table 9.12). Treating this area would require an investment of $1.7 billion and increase net annual growth by about 1.1 billion cubic feet. This volume is equal to 39 percent of the net annual growth in 1976.

Figure 9.3

Economic Opportunities for Management Intensification by Ownership



stocking control. All cost and response data for conversion, regeneration, timber stand improvement, cleaning operations, and release practices for a number of sites, geographic categories, and species were averages. All calculations were based on real costs, prices and interest rates measured in 1967 dollars; *i.e.*, adjusted to exclude changes resulting from inflation or deflation. The future stumpage prices used in the analysis were based on the projections shown in tables 8.2 and 8.7.

[26] The opportunities shown in table 9.10 include only those that are incremental to those currently scheduled or planned.

Table 9.10—*Economic opportunities*[1] *for increasing timber supplies in the contiguous States, by ownership,*[2] *region, and treatment opportunity*

Region and treatment opportunity	All ownerships			Other public[3]			Forest industry			Farmer and other private		
	Total	Cost of treatment	Net annual growth increment	Total	Cost of treatment	Net annual growth increment	Total	Cost of treatment	Net annual growth increment	Total	Cost of treatment	Net annual growth increment
	Million acres	*Million dollars*	*Million cubic feet*	*Million acres*	*Million dollars*	*Million cubic feet*	*Million acres*	*Million dollars*	*Million cubic feet*	*Million acres*	*Million dollars*	*Million cubic feet*
Northeast												
Reforestation—												
type conversion	0.2	10.9	8.5	(5)	0.5	0.4	...	......	......	0.2	10.4	8.1
Stocking control[4]	16.1	609.6	435.1	1.0	31.4	24.2	3.0	233.3	116.9	12.1	344.8	294.1
Total	16.3	620.5	443.6	1.0	31.9	24.6	3.0	233.3	116.9	12.3	355.2	302.2
North Central												
Reforestation—												
type conversion	14.3	1,662.0	895.6	1.6	220.1	133.1	.7	87.0	58.2	12.1	1,354.8	704.3
Stocking control[4]	4.2	81.7	231.7	.5	10.0	37.4	.3	2.6	12.4	3.4	69.2	181.9
Total	18.5	1,743.7	1,127.3	2.1	230.1	170.5	1.0	89.6	70.6	15.5	1,424.0	886.2
Southeast												
Reforestation—												
type conversion	52.6	4,933.8	4,463.2	2.4	228.8	206.1	7.4	643.6	592.3	42.8	4,061.4	3,664.8
Stocking control[4]	.6	19.8	23.7	(5)	.7	.9	.3	8.6	13.0	.2	10.5	9.7
Total	53.2	4,953.6	4,486.9	2.4	229.5	207.0	7.7	652.2	605.3	43.0	4,071.9	3,674.5
South Central												
Reforestation—												
type conversion	44.1	4,591.6	4,180.0	1.1	118.8	108.7	9.8	998.9	866.3	33.2	3,473.9	3,204.9
Stocking control[4]	19.5	541.8	425.9	.4	11.3	9.0	6.3	168.7	133.7	12.8	361.7	283.2
Total	63.6	5,133.4	4,605.9	1.5	130.1	117.7	16.1	1,167.6	1,000.0	46.0	3,835.6	3,488.1
Rocky Mountain[6]												
Reforestation—												
type conversion	.1	22.3	5.0	(5)	2.5	.5	(5)	4.4	.9	.1	15.3	3.6
Stocking control[4]	.1	3.5	3.2	(5)	1.0	.8	(5)	.5	.5	.1	1.9	1.9
Total	.2	25.7	8.2	(5)	3.5	1.3	(5)	4.9	1.4	.2	17.2	5.5
Pacific Northwest												
Reforestation—												
type conversion	6.0	1,613.0	1,355.6	1.9	523.9	399.3	2.5	664.1	590.5	1.6	425.1	365.8
Stocking control[4]	2.8	220.1	125.8	.7	51.9	30.1	1.6	134.1	74.9	.5	34.0	20.8
Total	8.8	1,833.1	1,481.3	2.6	575.8	429.4	4.1	798.2	665.4	2.1	459.1	386.6
Pacific Southwest												
Reforestation—												
type conversion	4.2	691.5	667.1	.3	49.9	36.6	1.5	232.5	293.8	2.4	409.1	336.7
Stocking control[4]	3.4	92.6	93.4	.1	5.2	1.7	.9	31.2	29.4	2.5	56.3	62.3
Total	7.7	784.1	760.5	.4	55.1	38.3	2.4	263.7	323.2	4.9	465.4	399.0
Contiguous States												
Reforestation—												
type conversion	121.5	13,525.0	11,574.0	7.3	1,144.5	884.7	21.9	2,630.5	2,402.0	92.4	9,750.0	8,288.2
Stocking control[4]	46.7	1,569.1	1,339.7	2.7	111.5	104.1	12.4	579.0	380.8	31.6	878.4	853.9
Total	168.3	15,094.1	12,913.7	10.0	1,256.0	988.8	34.3	3,209.5	2,782.8	124.0	10,628.4	9,142.1

[1]Includes those opportunities which would yield 4 percent or more in constant dollars (net of inflation or deflation) on the investment.
[2]All ownerships except National Forests. All economic opportunities for management intensification on National Forests are either presently scheduled or planned and thus do not meet the criteria for inclusion.
[3]All public ownerships except National Forests.
[4]Includes commercial and noncommercial thinning.
[5]Less than 50,000 acres.
[6]Includes only the economic opportunities in Idaho and Montana. Ongoing studies of the Forest Industries Council suggest that there may be economic opportunities for increasing timber supplies on an additional 900,000 acres in other Rocky Mountain States.

Table 9.11—*Economic opportunities*[1] *for increasing timber supplies in the Northeast, by existing stand condition and treatment opportunity*

Existing stand condition and treatment opportunity		Area	Cost		Net annual growth increment		Rate of return[2]
			Total	Average per acre	Total	Average per acre	
		Thousand acres	*Million dollars*	*Dollars*	*Million cubic feet*	*Cubic feet*	*Percent*
Nonstocked or stripmined	Plant pine with minimal site preparation	218	10.9	50	8.5	39	5
Overstocked young softwood plantations	Precommercial thin to improve stocking	298	8.9	30	8.9	30	8
Overstocked natural softwood stands of seedlings and saplings	Precommercial thin to improve stocking	346	10.4	30	17.3	50	7
Overstocked natural softwood poletimber stands	Precommercial thin to improve stocking	226	10.2	45	10.2	45	5
Overstocked mature natural white and red pine stands	Commercial thin	127	0	0	7.0	55	5
White pine seedlings and saplings	Precommercial thin, blister rust control, commercial thin, and prune	440	44.0	100	22.4	51	8
White pine poletimber	Blister rust control and commercial thin	523	0	0	25.1	48	9
Spruce-fir seedlings and saplings	Release	2,937	36.7	10	47.0	16	7
Maple-beech-birch seedlings and saplings	Precommercial thin, cull removal, and beech control	1,934	174.1	90	77.4	40	6
Maple-beech-birch poletimber and sawtimber	Commercial thin	1,072	0	0	26.8	25	6
Oak-hickory seedlings and saplings	Precommercial thin, cull removal, and beech control	1,972	177.5	90	69.0	35	8
Oak-hickory poletimber	Timber stand improvement and commercial thin	3,607	108.2	30	108.2	30	6
Oak-hickory sawtimber	Cull removal and commercial thin	2,640	39.6	15	15.8	6	4
All treatment opportunities		16,340	620.5	40	443.6	27	..

[1]Includes those opportunities which would yield 4 percent or more on the investment measured in constant dollars; *i.e.*, net of inflation or deflation.
[2]Measured in constant dollars; *i.e.*, net of inflation or deflation.

In contrast to the Northeast, there are substantial opportunities for reforestation and stand conversion in the North Central region. There are, for example, economic opportunities for seeding or planting on 1.3 million acres of nonstocked land and for regeneration of poorly stocked or mature stands on another 2.3 million acres. Implementation of these reforestation opportunities would increase net annual growth by 231 million cubic feet.

There are also economic opportunities to convert some 10.5 million acres, nearly all oak-hickory, maple-beech-birch, or aspen-birch on low and medium sites to red pine. This conversion would increase net growth by a little over 700 million cubic feet per year.

The large economic opportunities for reforestation/stand conversion in the North Central region compared to the Northeast primarily reflect three things. First, in the North Central region there are substantial acreages of nonstocked or poorly stocked lands with the associated relatively low reforestation costs. Second, estimated growth in plantations in the North Central region is higher than that in the Northeast. Third, there are significant differences in softwood pulpwood and sawtimber stumpage prices. Softwood pulpwood stumpage in the Northeast averaged about $3.25 per cord, while the same quality of pulpwood brought $7.00 per cord in the North Central region. Similarly, sawtimber averaged about $50 per thousand board feet in North Central stumpage markets, compared to $38 for comparable sales in the Northeast. Despite higher prices, over 4 million acres needing reforestation or conversion in the North Central region did not meet the economic standards of returning 4 percent on the required investments.

The great bulk of the increase in net annual growth from reforestation/type conversion would be softwoods, chiefly red pine. There are, however, opportunities to increase hardwood growth by nearly 200 million cubic feet by timber stand improvement and commercial thinning. There are about 2.6 million acres in the maple-beech-birch type and 1.6 million in oak-hickory types where this is economic.

The economic opportunities for timber stand improvement in the North Central region are on the higher site lands capable of growing more than 85 cubic feet per acre per year. Growth rates on these areas, as indicated in table 9.12, could be increased by 38 to 50 cubic feet each year on each acre treated. Furthermore, periodic returns from commercial thinning eliminate extended time lapses wherein no income is derived from the forestry investment. These stocking control options with improved cash flows may appeal to the farmer and other private landowners, who control 8 of every 10 acres of hardwoods on the more productive sites.

As in the Northeast, the bulk of all of the economic opportunities both in terms of area and potential increases in net annual growth in the North Cen-

Table 9.12—*Economic opportunities*[1] *for increasing timber supplies in the North Central, by existing stand condition and treatment opportunity*

Existing stand condition	Treatment opportunity	Area	Cost: Total	Cost: Average per acre	Net annual growth increment: Total	Net annual growth increment: Average per acre	Rate of return[2]
		Thousand acres	*Million dollars*	*Dollars*	*Million cubic feet*	*Cubic feet*	*Percent*
Nonstocked	Seed pine with minimal site preparation	920	46.0	50	33.1	36	7
Nonstocked	Prepare site and plant red pine	372	27.9	75	36.5	98	6
Poorly stocked jack pine	Regenerate by planting	293	29.3	100	23.4	80	5
Poorly stocked spruce-fir	Regenerate naturally	896	26.9	30	46.6	52	7
Mature aspen-birch on high sites	Regenerate naturally	1,141	34.2	30	91.3	80	6
Poorly stocked jack pine on low sites	Convert to red pine	56	5.6	100	2.6	46	7
Oak-hickory on low and medium sites	Convert to red pine	6,296	881.4	140	308.5	49	6
Aspen-birch on low and medium sites	Convert to red pine	1,819	254.7	140	160.1	88	7
Maple-beech-birch on low sites	Convert to red pine	2,283	319.6	140	230.6	101	6
Young red pine plantations	Commercial thin	235	0	0	3.3	14	7
Oak-hickory	Improve timber stand and commercial thin	1,623	45.4	30	61.7	38	6
Maple-beech-birch on high and medium sites	Improve timber stand and commercial thin	2,593	72.6	30	129.7	50	6
All treatment opportunities		18,527	1,743.7	95	1,127.3	61	..

[1]Includes those opportunities which would yield 4 percent or more on the investment measured in constant dollars; *i.e.*, net of inflation or deflation.
[2]Measured in constant dollars; *i.e.*, net of inflation or deflation.

tral region are on the farmer and other private ownerships.

Economic Opportunities for Increasing Timber Supplies in the Southeast. There are economic opportunities for increasing timber supplies on over 53 million acres, or over half of the commercial timberland in the Southeast (table 9.13). Treatment of this area would increase net annual growth by 4.5 billion cubic feet, close to the 5.1 billion cubic feet attained in 1976. Achieving this additional growth would require an investment of $5.0 billion.

On an area basis, almost 99 percent of the economic opportunities consist of some form of stand conversion or reforestation. There are, for example, economic opportunities to convert over 28 million acres of oak-hickory and oak-pine stands to pine and this would increase net annual softwood growth by 2.3 billion cubic feet. There are also large acreages, 17 million in total, ready for harvest and regeneration. Although most of this acreage is pine stands, it includes some 6.6 million acres of mature bottomland hardwoods.

There are economic opportunities for planting on some 5.2 million acres of understocked commercial timberland and 3.2 million acres of idle cropland. The potential rates of return on the investments necessary for planting this land are high, 16 percent in the case of the idle cropland. However, the cropland is largely high-site land in the hands of farmers. Generally, agricultural options promise even higher returns with a shorter commitment of time, and there is little likelihood that these owners will convert many of these acres to forestry.

The economic opportunities for timber stand improvement in the Southeast are limited, amounting to only 0.6 million acres of young pine plantations overrun with brush and hardwoods. But the potential yields from the investment needed for this work are high—18 percent. Increments to net annual growth are much higher in the other kinds of opportunities, but rates of return are determined by the interplay of costs, prices, and yields. In the case of timber stand improvement, yield response is low, about half a cord an acre per year, but costs are minimal and investment length is only about 20 years. The result is high rates of return on the needed investments.

As in other regions, the great bulk of the economic opportunities for increasing net annual timber growth in the Southeast are on the farmer and other private ownerships. Virtually all of the opportunities on these ownerships involve either reforestation or stand conversion.

Economic Opportunities for Increasing Timber Supplies in the South Central Region. Measured in acres and by the potential increases in net annual timber growth, the economic opportunities in the South Central region are the largest in the Nation (table 9.14 and fig. 9.4). In total, there are some 63.6 million acres, nearly two-thirds of the commercial timberland in the region, that could be treated to increase timber supplies and which would yield 4 percent or more on the investment. In total, these investments would amount to $5.1 billion. If made, net annual growth would be increased by 4.6 billion cubic feet, only 1.2 billion cubic feet below the net annual growth attained in 1976.

As in the Southeast, the largest opportunities are for some form of reforestation or stand conversion. There are, for example, economic opportunities to clear, site prepare, and plant to pine nearly 28 million acres. Most of this area, some 20 million acres, is in oak-hickory stands on pine sites. There are opportunities on another 8.7 million acres to harvest existing stands, chiefly mature pine sawtimber, site prepare, and plant pine. All the planting

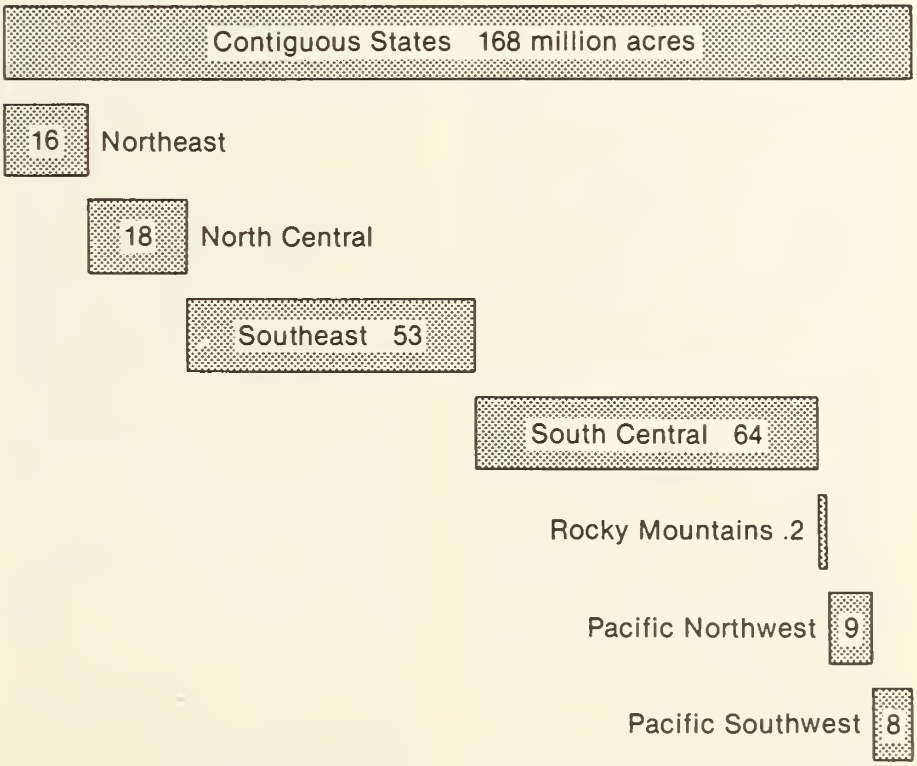
Table 9.13—*Economic opportunities*[1] *for increasing timber supplies in the Southeast, by existing stand condition and treatment opportunity*

Existing stand condition	Treatment opportunity	Area	Cost: Total	Cost: Average per acre	Net annual growth increment: Total	Net annual growth increment: Average per acre	Rate of return[2]
		Thousand acres	*Million dollars*	*Dollars*	*Million cubic feet*	*Cubic feet*	*Percent*
Nonstocked	Prepare site and plant pine	4,236	402.4	95	419.4	99	11
Idle cropland	Plant with minimal site preparation	3,237	97.1	30	462.9	143	16
Understocked oak-pine	Convert to pine	5,909	679.5	115	543.6	92	10
Scrub oak stands	Convert to pine	536	61.6	115	45.6	85	10
Chestnut oak stands	Convert to pine	391	45.0	115	26.2	67	9
Oak-hickory stands	Convert to pine	21,268	2,445.8	115	1,701.4	80	10
Poorly stocked or damaged pine plantations	Early harvest, prepare site, and plant pine	271	25.7	95	34.4	127	13
Well-stocked, mature natural pine stands	Harvest, prepare site, and plant pine	5,120	468.4	90	419.8	82	10
Understocked natural pine stands	Harvest, prepare site, and plant pine	5,026	477.5	95	467.4	93	11
Mature bottomland hardwood stands	Harvest and naturally regenerate	6,595	230.8	35	342.9	52	8
Young pine plantations over-run by competition	Improve timber stand	566	19.8	35	23.2	41	18
All treatment opportunities		53,155	4,953.6	95	4,486.9	84	..

[1]Includes those opportunities which would yield 4 percent or more on the investment measured in constant dollars; *i.e.*, net of inflation or deflation.
[2]Measured in constant dollars; *i.e.*, net of inflation or deflation.

Figure 9.4

Economic Opportunities for Management Intensification by Region



opportunities together would increase net annual softwood growth by 3.6 billion cubic feet, and the expected rates of return on the investments would be in the 10-11 percent range.

In contrast to the Southeast, there are substantial economic opportunities —some 27 million acres in total—for timber stand improvement in the South Central region. All of these opportunities are on pine or oak-pine stands; implementation would increase softwood supplies by 0.6 billion cubic feet per year.

The prospective rates of return on the investment in the timber stand improvement opportunities are high, from 11 up to 26 percent. This reflects several things. First, the per acre costs of the timber stand improvement opportunities are relatively low. Second, these investments are made in established stands where payoffs occur in a relatively short time. Third, although growth increments are small, they are added to softwood sawlog and veneer log timber, which brings premium prices.

About three-quarters of the economic opportunities for reforestation/stand conversion and two-thirds of those for timber stand improvement in the South Central region are on the farmer and other private ownerships. Nearly all of the remaining opportuni-

Table 9.14—*Economic opportunities*[1] *for increasing timber supplies in the South Central, by existing stand condition and treatment opportunity*

Existing stand condition and treatment opportunity		Area	Cost		Net annual growth increment		Rate of return[2]
			Total	Average per acre	Total	Average per acre	
		Thousand acres	*Million dollars*	*Dollars*	*Million cubic feet*	*Cubic feet*	*Percent*
Mature pine sawtimber	Harvest, prepare site, and plant pine	5,504	605.4	110	467.8	85	11
Understocked oak-pine sawtimber	Harvest, prepare site, and plant pine	89	9.8	110	7.9	89	11
Understocked pine poletimber and sawtimber	Harvest, prepare site, and plant pine	3,114	342.5	110	249.1	80	11
Understocked oak-pine poletimber or seedlings and saplings	Clear, prepare site, and plant pine	3,620	398.2	110	427.2	118	11
Oak-hickory on pine sites	Clear, prepare site, and plant pine	20,172	2,218.9	110	2,118.1	105	11
Understocked pine seedlings and saplings	Clear, prepare site, and plant pine	4,044	444.8	110	311.4	77	10
Medium stocked pine poletimber and sawtimber	Release, burn and underplant pine	7,545	528.2	70	588.5	78	15
Overstocked oak-pine poletimber or seedlings and saplings	Improve timber stand to control stocking and favor pine	7,847	235.4	30	204.0	26	14
Overstocked pine poletimber and sawtimber	Improve timber stand to control stocking	7,151	214.5	30	114.4	16	26
Overstocked pine seedlings and saplings	Improve timber stand to control stocking	4,518	135.5	30	117.5	26	11
All treatment opportunities		63,604	5,133.4	80	4,605.9	72	..

[1]Includes those opportunities which would yield 4 percent or more on the investment measured in constant dollars; *i.e.*, net of inflation or deflation.
[2]Measured in constant dollars; *i.e.*, net of inflation or deflation.

ties are on the forest industry ownerships.

Economic Opportunities for Increasing Timber Supplies in the Rocky Mountains. Large acreages of forested lands lie in the Rocky Mountain timber supply section. However, for a number of reasons, very few of these acres present economic opportunities for increasing timber supplies. Steep slopes, fragile soils, and other environmental factors eliminated large areas from consideration for intensive forest management.

Most commercial forest lands are in the National Forest System, where the economic opportunities for increasing timber growth through intensive management are already in formal plans and included in timber supply projections. Furthermore, the existing data for much of the section were not adequate for estimating economic opportunities by forest type, stand condition, site class, physiographic category, and ownership. As a result, analysis of economic opportunities for increasing timber supplies in the Rocky Mountains was restricted to Idaho and Montana. These States have significant acreage of privately owned land currently being managed for timber, and enough data exists to evaluate the economic treatment opportunities.

In these States, 222,000 acres were identified as offering economic opportunities for increasing timber supplies (table 9.15). These opportunities were about equally divided between reforestation of nonstocked areas and release of seedling and sapling stands. If treated, the net annual growth in Idaho and Montana would be increased by 8 million cubic feet. This would require an investment of about $26 million.

The per acre costs of reforestation are high, $210 per acre, because they include site preparation, planting, and precommercial thinning. As a result of this and various other factors including relatively low stumpage prices, the prospective rates of return on the investments in the treatment opportunities are in the 4 to 5 percent range.

There are undoubtedly additional economic opportunities for increasing timber supplies in the other Rocky Mountain States. Ongoing studies by the Forest Industries Council suggest that the opportunities in these other States are similar to those in Idaho and Montana and could include another 900,000 acres. As in other regions, most of the opportunities in all States are on the farmer and other private ownerships.

Although the economic opportunities in the Rocky Mountain section are not large when compared to other timber regions, they could increase timber supplies and contribute in a significant way to the economic base of many of the States in the section.

Economic Opportunities for Increasing Timber Supplies in the Pacific Northwest. There are economic opportunities for increasing timber supplies on nearly 9 million acres of commercial timberland in the Pacific Northwest (table 9.16). Treating these acres would require an investment of $1.8 billion, and increase net annual growth by 1.5 billion cubic feet. This volume is equal to a little over half of the net annual growth achieved in 1976.

The forests and growing conditions on the west and east sides of the Cascade Mountains in Oregon and Washington are quite different. In recognition of this, the evaluation of economic opportunities was made separately for the Douglas-fir subregion (western Oregon and western Washington) and the ponderosa pine region (eastern Oregon and eastern Washington).

Table 9.15—*Economic opportunities*[1] *for increasing timber supplies in the Rocky Mountains,*[2] *by existing stand condition and treatment opportunity*

Existing stand condition and treatment opportunity		Area	Cost: Total	Cost: Average per acre	Net annual growth increment: Total	Net annual growth increment: Average per acre	Rate of return[3]
		Thousand acres	*Million dollars*	*Dollars*	*Million cubic feet*	*Cubic feet*	*Percent*
Nonstocked	Prepare site, plant, precommercial thin and commercial thin.......	106	22.3	210	4.8	45	5
Suppressed ponderosa and lodgepole pine seedlings and saplings	Release and commercial thin......	58	1.7	30	1.5	26	5
Suppressed Douglas-fir seedlings and saplings	Release and commercial thin......	30	.9	30	.7	23	5
Suppressed spruce-fir seedlings and saplings	Release and commercial thin......	28	.8	30	1.3	46	4
All treatment opportunities..........		222	25.7	115	8.2	37	..

[1]Includes those opportunities which would yield 4 percent or more on the investment measured in constant dollars; *i.e.*, net of inflation or deflation.
[2]Includes only the economic opportunities in Idaho and Montana. Ongoing studies of the Forest Industries Council suggest that there may be economic opportunities for increasing timber supplies on an additional 900,000 acres in other Rocky Mountain States.
[3]Measured in constant dollars; *i.e.*, net of inflation or deflation.

Most of the economic opportunities—some 6.5 out of 8.8 million acres—for increasing timber supplies are in the Douglas-fir subregion. In this subregion, reforestation on lands nonstocked or poorly stocked with hardwoods is the largest opportunity. There are also overmature stands ready for harvesting and planting. Carrying out these reforestation opportunities would increase net annual growth by 1.3 billion cubic feet, nearly all of the potential in the Pacific Northwest. This, in part, reflects the high average per acre growth, 270 cubic feet per acre per year, attainable in plantations on the very productive sites in the Douglas-fir region.

In addition to reforestation, there are economic opportunities to thin and fertilize on some 1.6 million acres of overstocked stands in the Douglas-fir region. This would not add much to net annual growth but it would increase the value of the stumpage. As a result, the rates of return are close to or above those obtainable in the reforestation opportunities.

In comparison to the Douglas-fir region, the economic opportunities to increase timber supplies in the ponderosa pine subregion are relatively small, amounting to less than 0.1 billion cubic feet. However, as in the Rocky Mountains, this would contribute in a significant way to the economic base of the area.

The distribution of the economic opportunities by ownership in the Pacific Northwest is quite different from that in other regions. This is the only region in which the opportunities on the farmer and other private ownerships do not predominate. On an area basis, nearly half of the total is on forest industry ownerships, another 30 percent is on the other public ownerships, chiefly in the State ownerships.

The 8.8 million acres on which there are economic opportunities for increasing timber supplies in the Pacific Northwest represent only 5 percent of the national total of 168 million acres. However, because of the high productivity of the lands in the Douglas-fir subregion, this area if treated would supply about 12 percent of the potential economic increase in net annual growth.

Economic Opportunities for Increasing Timber Supplies in the Pacific Southwest. In the Pacific Southwest, there are economic opportunities to increase net annual growth by some 0.8 billion cubic feet (table 9.17). Achieving this potential would double the net annual growth in 1976 and require an investment of $784 million.

There are treatment opportunities on 7.7 million acres of commercial timberland. As in most regions, reforestation opportunities had the greatest potential for raising net annual growth while realizing high return on the investments. The reforestation opportunities, which consist of harvest of mature stands and planting, and the rehabilitation and planting of Douglas-fir, redwood, and mixed conifer sites, could add 647 million cubic feet to net annual growth, about 85 percent of the total economic potential. Achieving this level would require investments totaling $702 million. Rates of return on the investments on the redwood and Douglas-fir sites would range from 9 to 12 percent.

There is a variety of opportunities for stocking control—from release of seedling and sapling stands at ages of 5 to 10 years to commercial thinning. The prospective rates of return on the investments in these opportunities also vary, from 5 percent on precommercial thinning to 12 percent on release of redwood and Douglas-fir seedling and saplings. Rates of return on commercial thinning opportunities were not calculated since the net costs are zero and yields without treatments were not estimated. However, commercial thinning is financially attractive in terms of present net value and immediate returns. Furthermore, the potential increases in net annual growth per acre are sizable, ranging from 40 to 75 cubic feet.

As in most regions, the largest part of the economic opportunities in the Pacific Southwest is on farmer and other private ownerships. Again, as in most regions, nearly all of the remaining opportunities are on the forest industry ownerships.

Prospective Impacts of Implementing the Economic Opportunities for Management Intensification. The analysis of the economic opportunities presented above is based on the projections of equilibrium stumpage prices shown in tables 8.2 and 8.7. Implementation of the economic opportunities for management intensification would have, in time, large impacts on the softwood timber resource and on stumpage prices. In recognition of this, and the

Table 9.16—*Economic opportunities*[1] *for increasing timber supplies in the Pacific Northwest,*[2] *by subregion, existing stand condition, and treatment opportunity*

Subregion, existing stand condition, and treatment opportunities.		Area	Cost: Total	Cost: Average per acre	Net annual growth increment: Total	Net annual growth increment: Average per acre	Rate of return[3]
		Thousand acres	*Million dollars*	*Dollars*	*Million cubic feet*	*Cubic feet*	*Percent*
Douglas-fir subregion (Western Washington and western Oregon)							
Nonstocked or poorly stocked with hardwoods	Reclaim, prepare site, plant, precommercial and commercial thin	2,693	807.9	300	727.1	270	9
Over mature stands	Harvest, prepare site, plant, precommercial and commercial thin	2,226	690.1	310	601.0	270	8
Overstocked young stands	Precommercial thin, fertilize, and commercial thin	581	63.9	110	29.1	50	7
Overstocked stands, age 35–75	Commercial thin and fertilize	1,035	41.4	40	51.8	50	12
Ponderosa Pine subregion (Eastern Washington and eastern Oregon)							
Nonstocked or poorly stocked with hardwoods	Reclaim, prepare site, plant, precommercial and commercial thin	685	119.9	175	24.0	35	5
Over mature stands	Harvest, prepare site plant, precommercial and commercial thin	440	77.0	175	15.4	35	5
Overstocked conifer saplings	Release	41	1.0	25	.7	17	6
Overstocked stands, age 15–25	Precommercial and commercial thin	798	31.9	40	24.7	31	7
Overstocked stands, age 50–70	Commercial thin	331	0	0	7.6	23	([4])
All treatment opportunities		8,830	1,833.1	208	1,481.3	168	..

[1]Includes those opportunities which would yield 4 percent or more on the investment measured in constant dollars; *i.e.,* net of inflation or deflation.
[2]Excludes Alaska.
[3]Measured in constant dollars; *i.e.,* net of inflation or deflation.
[4]Undefined. Treatment costs are zero and yields without treatment were not estimated.

likelihood that management will be more intensive than assumed in the base level analysis, the regionally disaggregated economic simulation model described above [27] was used to estimate future softwood supplies, net annual growth, inventories and stumpage price trends, assuming the economic opportunities which would yield 4 percent or more measured in 1967 dollars were implemented on private lands.

The analysis showed that if management were intensified to take advantage of all the opportunities which would yield 4 percent or more (measured in 1977 dollars), net annual softwood timber growth would rise to 17.2 billion cubic feet in 2000, some 30 percent above the base level management–equilibrium harvest projection of 13.3 billion cubic feet (table 9.18). By 2030, with more time for intensified management activities to affect the timber resource, projected net annual growth would be 23 billion cubic feet, more than double the base level management–equilibrium harvest projection of 11.8 billion cubic feet. In line with the location of the economic opportunities shown in table 9.10, the largest part of the increase in net annual growth resulting from management intensification is in the South.

The increase in net annual growth resulting from management intensification has dramatic impacts on softwood timber inventories in the South and, to a lesser extent, in the Pacific Coast and the North. In the South, the large drop in inventories projected under the base level management–equilibrium harvest assumptions is reversed and inventories rise rapidly, especially toward the end of the projection period. As a result, the inventory in 2030 is nearly 3 times the level in 1976. In accord with the economic opportunities, most of the increase in inventories in the South is on the farmer and other private ownerships. In contrast, but again in accord with the economic opportunities, most of the increase in inventories from intensive management in the Pacific Coast section is on the forest industry ownerships. By 2030 the inventories on forest ownerships in the Douglas-fir region are nearly 73 percent higher than was the case assuming base level management–equilibrium harvests and the inventory level is roughly stabilized at 1,900 cubic feet per acre.

The projected increases in inventories stimulate increases in timber supplies (harvests) except in the North and Rocky Mountain sections. The rapid increases in inventories in the South and Pacific Coast, and the associated effects on stumpage prices, also result in a shift of processing capacity to these sections.

The increase in timber supplies resulting from intensive management is relatively small in the near term, amounting to only 2 percent by 2000. By 2030 supplies are increased by 14 percent. The bulk of the near term increases come from the South owing to

[27] Adams and Haynes. *Op. cit.* Because of the changes in projected supplies and prices resulting from management intensification, it was necessary to reiterate the analysis several times to arrive at an equilibrium solution in which the economic opportunities for management intensification were consistent with projected changes in prices.

Table 9.17—*Economic opportunities*[1] *for increasing timber supplies in the Pacific Southwest,*[2] *by existing stand condition and treatment opportunity*

Existing stand condition	Treatment opportunity	Area	Cost: Total	Cost: Average per acre	Net annual growth increment: Total	Net annual growth increment: Average per acre	Rate of return[3]
		Thousand acres	*Million dollars*	*Dollars*	*Million cubic feet*	*Cubic feet*	*Percent*
Mature redwood and Douglas-fir	Harvest, prepare site, and plant	372	48.4	130	98.6	265	12
Mature coastal Douglas-fir	Harvest, prepare site, and plant	472	61.4	130	62.8	133	10
Mature interior mixed conifers	Harvest, prepare site, and plant	1,223	159.0	130	146.8	120	8
Redwood and Douglas-fir sites in need of rehabilitation	Rehabilitate, prepare site, and plant	481	96.2	200	127.5	265	11
Coastal Douglas-fir sites in need of rehabilitation	Rehabilitate, prepare site, and plant	723	144.6	200	96.2	133	9
Interior mixed conifer sites in need of rehabilitation	Rehabilitate, prepare site, and plant	962	192.4	200	115.4	120	7
Redwood and Douglas-fir, seedlings and saplings	Release at ages 5 and 10	133	5.3	40	6.4	48	12
Coastal Douglas-fir, seedlings and saplings	Release at ages 5 and 10	168	6.7	40	4.0	24	10
Interior mixed conifers, age 5	Release	78	1.6	25	1.5	19	9
Redwood and Douglas-fir, age 15	Precommercial thin	124	12.4	100	1.1	9	6
Coastal Douglas-fir, age 15	Precommercial thin	212	21.2	100	1.9	9	5
Interior mixed conifers, age 15-20	Precommercial thin	350	35.0	100	3.2	9	5
Redwood and Douglas-fir, age 30-55	Commercial thin	11	0	0	.8	73	(4)
Coastal Douglas-fir, age 30-55	Commercial thin	16	0	0	.7	44	(4)
Interior mixed conifers, age 30-60	Commercial thin	2,343	0	0	93.7	40	(4)
All treatment opportunities		7,668	784.1	100	760.5	99	..

[1]Includes those opportunities which would yield 4 percent or more on the investment measured in constant dollars; *i.e.*, net of inflation or deflation.
[2]Excludes Hawaii.
[3]Measured in constant dollars; *i.e.*, net of inflation or deflation.
[4]Undefined. Treatment costs are zero and yields without treatment were not estimated.

shorter rotations and faster growth response in southern pines.

During the early part of the projection period, and as a result of the limited increases in supplies, softwood stumpage prices with intensified management rise substantially, although the rates of increase are below those projected under base level management (table 9.19). Later in the projection period, as timber supplies rise more relative to the base level–equilibrium harvest projections, the rates of increase in stumpage prices begin to slow and in the southern and western regions peak and then decline. The peaks are reached in about two decades in the South and four decades in the Pacific Coast. Softwood stumpage prices in 2030 in these regions are significantly below the levels attained in the preceding decades. In the southern regions, where the supply responses from intensified management are concentrated, the index of softwood stumpage prices in 2030 is also significantly under the trend levels in 1976.

The lower softwood stumpage prices are reflected in product prices. For example, the average annual rate of increase in softwood lumber prices in the 1976–2000 period would be about 2.4 percent, somewhat below the 2.6 percent per year that is projected without intensified management. The increases in prices are concentrated in this early part of the projection period. After 2000, lumber and plywood prices remain nearly constant given the increases in supplies attainable with intensified management.

The increases in timber supplies associated with intensive management are also reflected in increased supplies of products and especially softwood lumber. Projected softwood lumber production in 2030 with intensive management is over 16 billion board feet above that projected under base level management–equilibrium harvest assumptions. This is enough to meet the projected increases in base level demands shown in table 8.12. There would also be an additional 7 billion board feet which could be used to replace imports or expand exports.

The Importance of Forest Land Ownership

While there are many biological and economic opportunities to increase timber growth, the owners of commercial timberland determine the purposes for which the land will be used and the way in which it will be managed. There is a broad range of objectives and financial and technical capabilities among the millions of owners of commercial timberland. In addition, there are various legal and institutional constraints and incentives that affect the way different owners manage and use their land and timber resources. Together, these considerations determine the extent to which the opportunities to increase timber growth have been and will be realized.

There are some common characteristics among the major commercial timberland ownerships. The National Forests and other public ownerships must rely on appropriations from Congress and other legislative bodies and are managed for a variety of purposes.

The owners of commercial timberland determine the purposes for which land will be used and the way it is managed. Frequently, the objectives of these owners, such as the maintenance of wildlife habitat, hunting, or the protection of forest scenery, constrains in some degree the use of the land for timber production.

some of which constrain timber production. Forest industry ownerships, on the other hand, are used primarily to supply timber for wood-using plants, and investments in timber management activities are strongly influenced by economic criteria. Most of the farmer and other private ownerships fall somewhere in between, although they cover the full range from only timber production to exclusive use for recreation or other nontimber purposes.

The farmer and other private ownerships, which contain nearly three-fifths of the Nation's commercial timberland, include housewives, doctors, lawyers, businessmen, all other occupational groups including retirees, and all industrial and business ownerships except those in the forest industries. Most of the timberland in these ownerships is in relatively small parcels. Most of this land is also favorably located with respect to the major timber product markets and has relatively productive soils. Further, and as indicated above, the largest potential for increasing timber growth in both biological and economic terms is on these farmer and other private ownerships.

The objectives of the farmer and other private owners affect the availability of timber from their lands and the extent to which they are managed for timber production.[28] These owners often state that the primary reason for owning forest land is in conflict with timber production and many report that they have not and will not harvest timber because scenery would be destroyed. Still others are unclear on the ecological consequences of timber harvesting. For example, some owners oppose cutting because it is believed that wildlife habitat will be destroyed, although it may actually be improved in some cases by harvesting. Nonetheless, for many farmer and other private owners, forest management seems to conflict in at least some degree with other ownership objectives.

Expectations on returns to investments and tenure also constrain the use of the commercial timberlands in farmer and other private ownerships for timber production. Returns from invest-

[28] There have been a number of studies in recent years which have been concerned with the characteristics, problems, and objectives of private timberland owners. These include:

Birch, T. W. and N. P. Kingsley. The forest land owners of West Virginia. Northeastern Forest Exp. Sta., U.S. Dep. Agric., Forest Serv. [In press.]

Brown, E. J. et al. Wyoming County woodland owners. Pennsylvania State Univ., College of Agric., Extension Serv., Extension Studies No. 39, University Park, Pa. 50 p. 1969.

Canham, Hugh O. Forest ownership and timber supply. State Univ., College of Environmental Science and Forestry, Syracuse, N.Y., 101 p. illus. 1973.

Holemo, Fred J. and E. Evan Brown. A profile of the private, non-industrial forest landowners in Georgia's Coastal Plain. Georgia Forest Res. Paper 82, Ga. Forest Res. Council, Macon, Ga., 16 p. illus., September 1975.

Kingsley, N. P. The forest land owners of Southern New England. Northeastern Forest Exp. Sta. U.S. Dep. Agric., Forest Serv., Res. Bull. NE-41, 27 p., illus. 1976.

Kingsley, N. P. The forest land owners of New Jersey. Northeastern Forest Exp. Sta. U.S. Dep. Agric. Forest Serv., Res. Bull. NE-39, 24 p. 1975.

Kingsley, N. P. and T. W. Birch. The forest land owners of Maryland. Northeastern Forest Exp. Sta. U.S. Dep. Agric., Forest Serv. [In press.]

Kingsley, N. P. and T. W. Birch. The forest land owners of New Hampshire and Vermont. Northeastern Forest Exp. Sta. U.S. Dep. Agric., Forest Serv., Res. Bull. NE-51. 47 p. 1977.

Kingsley, N. P. and J. C. Finley. The forest land owners of Delaware. Northeastern Forest Exp. Sta. U.S. Dep. Agric., Forest Serv., Res. Bull. NE-38, 19 p., illus. 1975.

McComb, W. H. Mismanagement by the small landowner: fact or fiction? J. Forestry 73(4):224–225. April 1975.

Quinney, D. M. Small private forest land owners in Michigan's Upper Peninsula. Lake States Forest Exp. Sta. U.S. Dep. of Agric., Forest Serv., Sta. Pap. No. 95, St. Paul, Minn., 22 p. illus. 1962.

Sedjo, Roger A. and David M. Ostermeier. Policy alternatives of nonindustrial private forests. Society of Am. Foresters and Resources for the Future, Washington, D.C., 64 p. 1978.

Stone, Robert M. A comparison of woodland owner intent with woodland practice in Michigan's Upper Peninsula. Univ. of Minn. Graduate School, unpub. Doctoral Thesis, St. Paul, Minn., 115 p. June 1970.

Turner, B. J., J. C. Finley, and N. P. Kingsley. How reliable are woodland owners' intentions? J. Forestry 75(8): 498–499, August 1977.

Table 9.18—*Softwood roundwood supplies, net annual growth, and growing stock inventory in the contiguous States, by section, 1952, 1962, 1970, and 1976, with projections under equilibrium levels of harvest and alternative management assumptions to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
North									
Base level management									
Roundwood supplies	596	501	549	636	910	1,033	1,137	1,232	1,322
Net annual growth	993	1,234	1,362	1,600	1,712	1,667	1,581	1,502	1,450
Inventory	27,629	34,332	39,661	44,574	55,835	62,946	68,259	71,828	74,080
Intensive management									
Roundwood supplies	596	501	549	636	900	1,023	1,123	1,241	1,331
Net annual growth	993	1,234	1,362	1,600	2,034	2,113	2,127	2,200	2,289
Inventory	27,629	34,332	39,661	44,574	57,880	68,724	78,967	90,171	99,894
South									
Base level management									
Roundwood supplies	3,049	2,709	3,531	4,234	5,688	6,238	6,848	7,242	7,514
Net annual growth	3,625	4,680	5,605	6,158	6,499	6,444	6,192	5,737	4,857
Inventory	58,245	71,553	84,896	97,136	111,681	116,055	113,612	103,564	84,298
Intensive management									
Roundwood supplies	3,049	2,709	3,531	4,234	5,730	6,461	7,591	8,780	9,677
Net annual growth	3,625	4,680	5,605	6,158	7,565	9,638	12,440	14,123	14,138
Inventory	58,245	71,553	84.896	97,136	115,966	138,493	175,955	227,791	276,126
Rocky Mountain									
Base level management									
Roundwood supplies	496	684	814	773	1,043	1,091	1,180	1,276	1,387
Net annual growth	1,097	1,253	1,449	1,589	1,751	1,828	1,878	1,899	1,902
Inventory	87,457	93,104	94,413	94,935	102,222	107,926	113,774	119,131	123,564
Intensive management									
Roundwood supplies	496	684	814	773	1,045	1,084	1,149	1,219	1,203
Net annual growth	1,097	1,253	1,449	1,589	1,750	1,826	1,877	1,902	1,913
Inventory	87,457	93,104	94,413	94,935	102,223	107,963	113,995	119,801	125,653
Pacific Coast[1]									
Base level management									
Roundwood supplies	3,381	3,360	3,688	3,759	3,935	3,713	3,799	3,835	3,853
Net annual growth	1,917	2,319	2,760	2,872	3,119	3,323	3,499	3,595	3,600
Inventory	207,580	198,359	188,012	178,510	157,665	150,690	147,454	145,147	143,361
Intensive management									
Roundwood supplies	3,381	3,360	3,688	3,759	3,947	3,743	3,879	4,014	3,950
Net annual growth	1,917	2,319	2,760	2,872	3,263	3,655	4,055	4,387	4,699
Inventory	207,580	198,359	188,012	178,510	158,557	153,469	154,231	157,312	163,243
Contiguous States									
Base level management									
Roundwood supplies	7,522	7,254	8,582	9,402	11,576	12,075	12,964	13,585	14,076
Net annual growth	7,673	9,526	11,218	12,261	13,081	13,262	131,150	12,733	11,809
Inventory	383,347	399,783	409,417	417,590	427,403	437,617	443,099	439,670	425,403
Intensive management									
Roundwood supplies	7,522	7,254	8,582	9,402	11,622	12,311	13,742	15,254	16,161
Net annual growth	7,673	9,526	11,218	12,261	14,612	17,232	20,499	22,612	23,039
Inventory	383,347	399,783	409,417	417,590	434,626	468,649	523,148	595,075	664.916

[1]Excludes Alaska and Hawaii.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Data for 1970, 1977, and the projection years are as of January 1.

ing in timber management typically take 10 to 20 years or more because it takes that long for trees to respond to most management practices. At the same time, the farmer and other private owners commonly hold forest lands for relatively short time spans. For example, in 9 Northeastern States, 53 percent of the privately held commercial timberland has been held by the same owner for fewer than 25 years and 30 percent for fewer than 10 years. And, in New York, it was found that 78 percent had been held by the same owner for fewer than 30 years. If the owner's objectives include holding timberland to realize an appreciation in land values over a period of time less than needed to realize benefits from a management practice, such management is unlikely to be done.

For the farmer or other private owner for whom timber production is only a secondary objective, lack of knowledge of timber markets and of forest management practices is often a serious limitation. Many owners simply lack information on the availability of markets for timber and on prices. For some owners, this is due to a lack of time or interest to search out available

Table 9.19—*Trend level[1] softwood stumpage price[2] indexes in the contiguous States, by region, 1952, 1962, 1970, and 1976, with projections of equilibrium price[3] indexes under alternative management assumptions to 2030*

(Index of price per thousand board feet, International ¼-inch log rule—1967=100)

Region	1952	1962	1970	1976	Projections									
					Base level management					Intensive management				
					1990	2000	2010	2020	2030	1990	2000	2010	2020	2030
Northeast	100.0	100.0	100.0	100.0	166.1	185.1	213.6	245.3	279.5	158.3	165.1	177.3	190.0	202.3
North Central	100.0	100.0	100.0	100.0	154.0	180.9	207.3	238.9	279.0	146.1	160.5	171.3	184.3	199.2
Southeast	57.8	83.3	111.6	138.9	229.6	280.0	358.0	434.6	526.8	217.6	222.8	214.7	156.6	81.9
South Central	57.8	83.3	111.6	138.9	230.6	281.6	358.5	434.3	524.7	220.6	224.7	214.2	161.6	101.5
Rocky Mountain	58.0	83.5	111.5	138.7	473.0	514.4	704.1	859.7	1,045.0	454.9	458.0	566.9	642.0	513.8
Pacific Northwest[4]														
Douglas-fir subregion														
(Western Washington and western Oregon)	43.8	75.9	118.0	164.2	275.0	228.2	287.4	355.8	430.3	261.4	198.6	227.7	245.6	197.9
Ponderosa Pine subregion														
(Eastern Washington and eastern Oregon)	80.6	93.1	104.4	113.8	300.5	330.6	425.1	500.8	608.1	299.6	298.6	346.2	297.1	287.3
Pacific Southwest[5]	52.9	80.9	113.6	146.5	300.8	334.7	416.3	490.2	579.9	284.2	289.7	315.6	333.4	249.9

[1]Prices on a least squares regression line fitted to time series price data for the years 1950–76.
[2]Prices are measured in constant (1967) dollars and are net of inflation or deflation. They measure price changes relative to the general price level and most competing materials.
[3]The prices which would result from stumpage prices rising enough to maintain an equilibrium between projected timber demands and supplies.
[4]Excludes Alaska.
[5]Excludes Hawaii.

sources of information. In many cases, however, the information does not exist in readily available form because markets are unstructured, there has been little interest in the past in collecting and organizing information, or there are no markets for timber.

Even when farmers and other private owners want to invest in forest management and are able to get the necessary information for making investment decisions, there are additional constraints. In many parts of the country, profits from growing timber are low. Fire, disease, insects, and extreme weather conditions can devastate standing timber. Returns to forest management investments require longer periods than most other investments. And returns are limited in any case by the rate of timber growth, which, like other biological phenomena, has certain limits.

In view of the above objectives, it is clear that at any given time part of the timber from farmer and other private ownerships is not available for harvesting. However, because tenure for forest lands is relatively short, it is likely that nearly all timber on these ownerships will at some time during its merchantable life be owned by someone who is willing to have it cut.

Although the timber on farmer and other private ownerships may over the long-term be available for harvesting, active management of these lands for enhanced timber production is less likely unless action is taken to reduce the various constraints on management described above.

Of the constraints facing farmers and other private owners of commercial timberland, perhaps the most important relate to capital and investment incentives. The available information indicates that many of the farmer and other private owners lack the capital for making the investments necessary for most management practices. Further, such investments are not attractive to many owners with the capital because of short planning horizons, lack of knowledge about the opportunities, or the existence of other investment options that are perceived to be better than those in timber management.

These problems have long been recognized as a major impediment to increasing timber supplies on the farmer and other private ownerships. The cost-sharing programs described above have been developed as a means of encouraging investments in various management practices on these ownerships. But what has not been adequately recognized is that many of the benefits of the investments in increasing timber supplies accrue to the society generally in the form of lower prices for stumpage and timber products. Lower prices reduce the cost to consumers of goods such as houses and furniture, the environmental pollution associated with use of substitute materials, such as steel and plastics, dependence on foreign sources of supply, and the rate of use of nonrenewable resources.

These broad economic, social, and environmental benefits, and the likelihood that even direct benefits such as income from timber sales will not accrue to current owners because of short tenures or life expectancy, suggest two things. First, there is a strong justification for publicly supported cost-sharing programs. Second, existing economic opportunities for management intensifications on the farmer and other private ownerships are not likely to be realized in any substantive way without cost-sharing programs.

There are, of course, other ways of inducing more intensive management that can supplement direct assistance. One of the problems related to investment incentives is markets for timber. Commercial timberland owners who have reasonable assurance that there will be a market for timber when it is mature are more likely to invest in management practices. For example, net growth of timber per acre as a percent of productive capacity on farmer and other private ownerships is higher in those regions with active markets for timber than in those regions with less active markets.

Access to active markets is a necessary condition for more intensive timber management on farmer and other private ownerships. Two other factors are also important, however. One is the problem of risk and uncertainty due to the long periods for which timber must be held until it is merchantable and the inherent susceptibility of timber to fire, disease, and insects. The other is the widespread lack of knowledge by farmer and other private owners regarding timber management practices.

Efforts to control wildfires and to suppress insect and disease attacks have been markedly successful. The large increases in timber inventory and growth over the past five decades would not have been possible without the effective Federal and State programs that have been in existence during this period. Farmers and other private owners, in particular, would have been unable to protect their forest lands against devastating loss in the absence of these programs and would have been unwilling to invest in forest management to any significant degree.

Even with effective programs to reduce risks in forest management, many owners lack knowledge of timber management practices. Thus, and as described in a preceding section, there is a need for technical assistance and for improving the dissemination of existing knowledge.

Firms that are primarily engaged in the manufacture of forest products hold nearly 68 million acres of commercial forest land, or about 14 percent of the Nation's total. The percentage of the total commercial forest land area owned by forest industry is higher than this in the South and Pacific Coast, somewhat lower in the North, and much lower in the Rocky Mountains.

The average productivity of all forest industry lands is substantially above that of the other major ownerships. This is especially true in those parts of the country where industry ownership is greatest. For example, productivity of industry lands exceeds the national average for all lands by 17 percent and in the Douglas-fir region it exceeds the average for all lands by 22 percent.

Although the holdings of forest industry and of individual firms tend to be concentrated in certain parts of the country, industry lands generally are mingled with other ownerships. While some individual tracts are large, many are relatively small and are often indistinguishable from surrounding forest lands. The objectives of ownership are, however, generally more narrowly focused than those of farmer and other private or public owners. The basic objective on forest industry ownerships is timber production. At the same time, forest industry firms are often cognizant of other resources and uses of forest lands and modify timber production practices to accommodate these other uses.

In spite of this clear interest by forest industry in holding lands that have high productivity for timber growing, current average net annual growth per acre is well below the potential. (See discussion page 137 and table 6.15.) Additional investments in timber management practices will be necessary to realize the full potential of these lands.

Management of forest industry lands is not usually constrained by lack of technical knowledge or by limited size of holdings, which are important constraints for farmer and other private ownerships. However, there are significant limits on the extent to which actual timber production can be increased. Risk from fire and disease or insect infestation, low returns to investments in management practices relative to other opportunities for investing funds, and legal or public relations constraints on

some management practices are important constraints.

Forest industry ownerships generally have more intensive forest fire, insect, and disease detection and suppression programs than are common on other private lands. This is often accomplished by supplementing Federal and State programs. Even so, risks in forest management are still higher than many other forms of investment for forest product firms. Also, public concern over clear-cutting and other forest practices has probably been directed more at practices on industry lands than other private lands because ownership is more concentrated. More important, however, as knowledge of forestry expands and new techniques and approaches are developed, have been the legal limitations on use of pesticides to control insects and diseases and herbicides to deaden undesired vegetation prior to planting or seeding to desired species. The problem of adjusting to changing legal requirements regarding pesticide and herbicide use has fallen most heavily on this category of ownership, because it has been ahead of the other ownerships in the use of new practices.

Forest industry lands have an important role in increasing timber supplies because of their extent and higher than average productivity. Limitations on this class of ownership to increase timber production are different from those facing farmers and other private owners. This must be recognized in attempts to mitigate such limitations.

Public ownership of commercial timberland ranges from the National Forests, which include 89 million acres, down to individual county and town holdings that encompass only a few acres. In between are some moderately large ownerships such as those of the Bureau of Land Management and some States such as Michigan, Minnesota, Pennsylvania, Washington, and Wisconsin. Together, these public ownerships include 136.6 million acres of commercial timberland.

The western National Forests are almost entirely made up of forest lands reserved from the original public domain. To a large extent, they were lands that were not suitable for agriculture, and they tended to be inaccessible and of relatively low productivity. The eastern National Forests were acquired primarily from private owners and, at the time of purchase, generally were cutover forest land or run-down farmland. Again, basic productivity often was low.

Much the same can be said for other public lands, although there is a greater range in productivity. Some, such as the revested Oregon and California railroad grant lands in western Oregon, which are administered by the Bureau of Land Management, are highly productive. Others, such as many of the county lands in Minnesota, which were obtained as tax delinquent lands in the 1930's, have low productivity.

Just as the timberlands themselves vary, the ownership objectives also vary. The National Forests are managed for a variety of uses and in some cases this means that timber production is not the primary objective even on land classed as commercial timberland. Many of the other public ownerships are also managed for multiple purposes with im-

The National Forests are managed for a variety of uses. Sometimes this imposes constraints on timber harvests and timber management.

portant constraints on timber management and harvests. However, this is not invariably true. Some of the State forest lands, such as those in Washington, must be managed to maximize income and this means, in effect, that timber production is the basic objective.

By their very nature, public ownership objectives and management of public timberlands are often modified to reflect changing public values. An example of this is the change in timber harvesting practices on the National Forests in response to public concern over clearcutting. Response to public values and concerns thus is an important determinant of future timber production from these lands. Similarly, concerns over use of pesticides or other developing technologies in timber production are sometimes focused on public rather than private timberlands because the managers must be responsive to public concerns.

Another, but important, constraint on timber production from public forests is the budgetary process. Most government budgets are made annually or biannually. For programs such as timber management, which require roads, regeneration of timber stands, and timber stand improvement, and for which timing is often vital, annual budgeting is a constraint on long-term planning and investments. Its effects are felt more severely at the county level than at the State and National levels.

The future of timber production on public ownerships depends in a major way on success in finding suitable ways to integrate timber production with other uses of forest land. It is likely that, as in the recent past, the use of these lands for purposes which will constrain timber production will become increasingly important.

Environmental and Renewable Resource Impacts of Timber Management

As described in various ways and various places above, programs associated with the protection of the environment and the use of commercial timberland for multiple purposes have important impacts on timber management and timber harvest. Conversely, the activities associated with timber management start a complex system of changes in the forest environment. These in turn affect public acceptance of timber-growing and harvesting practices.

The environmental impacts associated with practices such as regeneration, stand conversion, timber stand improvement, fertilization, and the associated timber harvesting, road construction, slash disposal or other disturbances vary widely. Because of this variation and the limited knowledge on impacts, it is difficult to be specific about the effects of timber management practices. It is possible, however, to describe in a general way the impacts on other resources.

For example, timber management activities, by their very nature, change the vegetation cover. Timber harvesting and slash disposal methods such as broadcast burning usually remove a large amount of all types of vegetation. This removal may be intensified by scarification and the use of herbicides designed to favor the regeneration of commercial tree species. Vegetation removal, while more severe with clearcutting, occurs to some degree with all types of timber harvests. Following the harvest, if regeneration is not successful, grasses, shrubs, and noncommercial tree species which were not harvested will predominate. With successful reforestation and perhaps subsequent timber stand improvement, commercial tree species are favored over noncommercial

species, shrubs, and brush. Artificial regeneration after harvesting can lead to entirely different forest types. This restructuring of the plant component, while beneficial in terms of increasing present and future timber supplies, has repercussions throughout the ecosystem.

Soils are primarily affected by direct disturbance during and after timber management activities through the removal of vegetation and through slash disposal. Road construction, skid trails, log dragging, and scarification for regeneration purposes all involve a high degree of soil disturbance. The actual amount varies both with the timber harvesting method and the care that is taken. For example, in a jammer group selection cut, 25 to 30 percent of the land will be bared by some type of road construction while high lead, skyline, and helicopter clearcuts bare from 1.2 to 6.2 percent of the land in roads.[29] This soil disturbance can cause serious erosion and mass movement, with the amount and timing depending on soil type, slopes, and amount of disturbance.[30,31]

In areas of steep topography and unstable soils in western Oregon, landslides were found to be the major source of stream sedimentation, and landslides occurred most frequently where logging roads crossed streams.[32] Soil disturbance can continue long after timber management activities end if roads and logging trails are not completely closed, and recreational vehicles take the place of logging vehicles.

In addition to erosion, some timber management activities can lead to soil compaction and decreased infiltration rates, which reduce the ability of plants to obtain needed water and nutrients from the soil.[33] Certain practices can also have other undesirable impacts. For example, slash disposal through burning damages soil microorganisms and significantly reduces nutrients. Burning can volatilize approximately one-third of the available nitrogen, significantly increase pH, and significantly reduce organic matter within the upper soil layers.[34] Studies in old growth Douglas-fir areas indicate that burning increases nutrient loss from 1.6 to 3 times over unburned areas.[35]

Vegetation removal has major effects on the water resource, both directly and through its effects on the soil. Water yields are increased with harvesting activities, but the amount of increase depends on site characteristics, precipitation, and basal area removed. It also affects the timing of water release, due to faster runoff during storms and by changing snow melting patterns.

Groundwater flows can also be significantly affected by removal of plants. Counter-balancing this groundwater effect in some regions will be the decrease in total infiltration and the increased use of groundwater by vigorous young trees replacing slowly growing harvested trees. In mountainous terrain, cuts associated with road construction and timber harvesting can interrupt groundwater flows, damaging downhill trees.

Impacts on the soil resource resulting from timber management actions can also lead to significant water resource effects. Eroded soils often end up in streams, raising the turbidity and leading to sediment deposits. When combined with increased water velocity from higher yields, this results in increased bottom scour and bank erosion, compounding the problem downstream. The amount of additional turbidity depends on the amount of erosion and the proximity of the stream to the eroding area.

Nutrients washed from forest soils often end up in streams.[36] Improper slash disposal near the water's edge and removal of riparian vegetation add to the nutrient problem, through debris pollution, and increase stream bank erosion. They can also increase water temperatures.[37]

All of these changes in the water resource lead to a habitat which may not support the same animal communities and will not have the same capacity for assimilating wastes, pollutants, and organic matter. In the extreme, this can lead to eutrophication and the filling of lakes and reservoirs with sediment deposits.

Herbicides used in timber management involve special water pollution and safety concerns. Their economic and increased productivity effects can be great, but as yet the scientific community cannot agree on their safety.

Millions of acres of wetlands have been drained since 1950, mostly in the South, and planted to pine—primarily loblolly, slash, and shortleaf.[38] This loss of wetlands affects not only plants and animals that depend on them for habitat, but also downstream waters, which remain pure due to the unique waste assimilation capabilities of wetlands.

Recreational access for hunting and fishing and some other recreation travel is usually improved with road construction for logging and other forestry operations. Adverse recreational impacts are also common, however, as in cases where esthetic qualities of forest areas for recreational viewing, hiking, or camping are reduced by logging operations.

Fish and wildlife play an important role in a forest ecosystem and react in complex ways to changes in timber management practices. Changes in vegetation type inevitably affect the kind and amount of habitat available for different species of wildlife, and thus result in animal community composition. Species dependent on climax forests (e.g., wolverine, pileated woodpecker) will become less common following logging, while species dependent on subclimax habitats (e.g., eastern cottontail, MacGillivray's warbler) will become more common. In a 10-year study in

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[29] Meghan, Walter F. Reducing erosional impacts of roads. *In* Guidelines for watershed management, Food and Agriculture Organization of the United Nations. Rome, p. 237–261. 1977.

[30] Brown, Harry E., M. B. Baker, Jr., J. J. Rogers, and others. Opportunities for increasing water yields and other multiple use values on ponderosa pine forest lands. U.S. Dep. Agric., Forest Serv., Res. Pap. RM-129, 36 p. 1974.

[31] Pope, P. Water quality and forestry: A review of water quality legislation and the impact of forestry practices on water quality. Dep. Forestry and Natural Resources. Purdue Univ. Sta. Bull. No. 161 (July), 19 p. 1977.

[32] Fredriksen, R. L. Erosion and sedimentation following road construction and timber harvest on unstable soils in three small western Oregon watersheds. *In* U.S. Dep. Agric., Forest Serv., Res. Pap. PNW-104. 1970.

[33] Anderson, Henry W., Marvin D. Hoover and Kenneth G. Reinhardt. Forests and water: effects of forest management on floods, sedimentation and water supply. U.S. Dep. Agric., Forest Serv., Gen. Tech. Rep. PNW-18. 1976.

[34] Debyle, Norbert V. Soil fertility as affected by broadcast burning following clearcutting in Northern Rocky Mountain larch/fir forests. *In* Proc., Montana Tall Timbers Fire Ecology Conference and Fire and Land Management Symposium, No. 14. 1974, p. 447–464. 1976.

[35] Rothacher, Jack and William Lopushinsky. Soil stability and water yield and quality. *In* Environmental effect of residues management in the Pacific Northwest. U.S. Dep. Agric., Forest Serv., Gen. Tech. Rep. PNW-24 P.D-1-D-19. 1974.

[36] Reinhardt, K. G. Timber-harvest clearcutting and nutrients in the Northeastern United States. U.S. Dep. Agric., Forest Serv., Res. Note NE-170. 1973.

[37] Brown, George W. Water temperatures in small streams as influenced by environmental factors and logging. *In* Forest land uses and stream environment, proceedings of the symposium held Oct. 19-21, 1979, School of Forestry, Oregon State Univ., Corvallis, p. 175–181. 1971.

[38] Keller, Walter M. Effects of unrestricted swamp drainage. Wildlife in North Carolina, p. 15–30. 1965.

a New York hardwood forest, 11 of the 26 most frequently observed songbird species were unaffected by 4 different logging intensities, 8 became more abundant, and 7 were less abundant. The number of species and diversity indices for songbirds increased with increased logging intensity.[39]

Many species (e.g., deer and elk) are dependent on a mosaic of climax and subclimax habitats. The optimum ratio of forage areas to cover areas has been described as 60 to 40 for deer and elk in the Blue Mountains of Oregon.[40] Thus, timber harvesting that reduced cover to 40 percent of a given area would be expected to increase deer and elk populations, but further harvesting would decrease populations.

Forest management practices that alter the vegetative cover and reduce structural diversity will generally reduce wildlife abundance and diversity by reducing habitat essential to many species. The specific effects of forest management activities on wildlife depend on the habitat requirements of the animal species occurring on the site and also on detailed characteristics of the activities.[41]

Fish are very responsive to changes in habitat. Erosion and unremoved slash contribute to the forest residue, which in turn reduces the dissolved oxygen concentrations in streams, creating an undesirable habitat for most fish species. Levels of about 3 to 5 parts per million of dissolved oxygen are needed to sustain fish over long periods, and levels less than 1 part per million over short periods may be fatal.[42] Large temperature increases due to removal of riparian vegetation may also be fatal to fish. Changes in water habitat are especially damaging to fish reproduction. After eggs hatch, the physical environment becomes less important than availability of food.[43]

Invertebrates are also affected by management activities. Soil disturbances, such as compaction and altered infiltration rates, cause habitat changes that can drastically alter the invertebrate population in the soils. This population, in turn, affects the availability of food for amphibians, reptiles, small mammals, and birds.

Air pollution from timber management activities primarily is caused by particulates, such as smoke and dust, and carbon monoxide and dioxide. The concentration and duration of this pollution at specific locations in the forest varies by type of pollutant and also by day-to-day and year-to-year weather patterns.

Particulates are a major concern with road construction, vegetation removal, or slash disposal activities. About a quarter of the estimated 6.1 million metric tons of particulates emitted each year into the atmosphere is due to the burning of forest fuels. Though the general increase in carbon dioxide is usually attributed to fossil fuels, it is a major product of combustion of woody materials.

The environmental impacts from timber management activities described above are likely to be limited during any year to a small percentage of the 488 million acres of commercial timber land. For example, less than 2 million acres are planted each year and fires occur on about 3 million acres.

In West Coast stands under intensive management, it is estimated that entries into a forest will normally be made with some type of equipment every 10 years or so for such purposes as planting, precommercial thinning, commercial thinning, prelogging, and final harvest. It may also be necessary to enter the forests on other occasions for fire control or salvage of blow-down or insect-killed timber.

A Qualified View of the Opportunities for Increasing Timber Supplies

In appraising the opportunities and especially the economic opportunities for increasing timber supplies presented above, we must keep in mind two things. First, they are estimates largely based on the judgments of experts drawn from universities, forest industries, the Forest Service, and State forestry agencies. Second, they include all the commercial timberland in the defined stand conditions without regard to the size of tracts, accessibility, or the objectives of the owners or publicly imposed environmental constraints. In view of these limitations and constraints, it is obvious that the estimates are not an exact measure of the economic opportunities that exist in the various regions of the country. Nonetheless, and after allowances for possible uncertainties, it is evident that very large opportunities do exist to invest in timber management practices that will yield good rates of return and result in major increases in the Nation's timber supplies. It is also clear that the potential exists to dramatically change the timber outlook in the next half-century. Within that period, domestic forests with intensified management could produce enough timber to greatly diminish or eliminate the adverse social, economic and environmental effects of an economic scarcity of timber described above. More specifically with intensified management it would in time be possible to:

1. Meet the projected increases in base level demands for timber products and stabilize stumpage and timber product prices.
2. Reduce dependence on imports, especially of softwood lumber, and expand the potential for export of all timber products.
3. Provide the raw material necessary for the growth of the timber industries and for the wood-using sectors of the economy including housing.

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[39] Webb, William L., Donald F. Behrend and Boonruang Saisorn. Effects of logging on songbird populations in a northern hardwood forest. Wildlife Monographs, No. 55. 35 p. 1977.

[40] Thomas, Jack Ward, Chris Maser and Jon E. Rodick. Relationships of Rocky Mountain mule deer and Rocky Mountain elk habitat to timber management in the Blue Mountains. *In* Wildlife habitats in managed forests—the Blue Mountains of Oregon and Washington. Edited by Jack Ward Thomas. U.S. Dep. Agric., Misc. Pub. (In process.) 1978.

[41] Webb, William L. Timber and wildlife. *In* Report of the President's Advisory Panel on Timber and Environment, p. 468–489. 1973.

[42] Brown, George W. Fish habitat, *In* Environmental effects of forest residues management in the Pacific Northwest. U.S. Dep. Agric., Forest Serv., Gen. Tech. Rep. PNW-24, p. E-1–E-14. 1974.

[43] Gibbons, Dave R. and Ernest O. Salo. An annotated bibliography of the effects of logging on fish of the western United States and Canada. U.S. Dep. Agric., Forest Serv., Gen. Tech. Rep. PNW-10, 145 p. 1973.

Chapter 10
Opportunities for Extending Timber Supplies

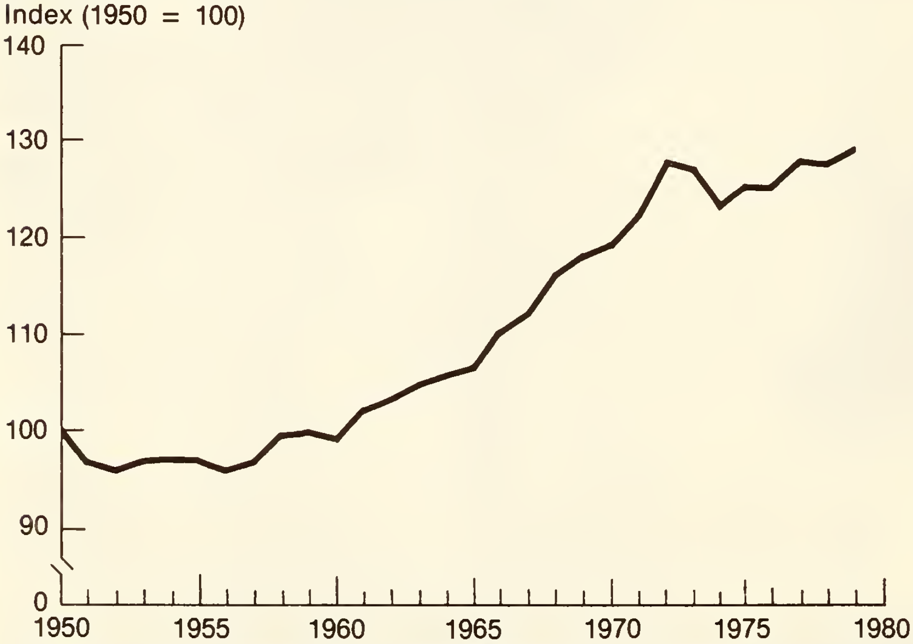
The preceding discussion has been concerned with the opportunities to meet rising demands for timber products by increasing net annual timber growth. Part of the projected increases in demand can be met in other ways by (1) utilizing unused wood in the Nation's forests and urban areas, and (2) reducing the demands for timber by improving efficiency in manufacturing and construction and extending the service life of wood products and structures.

Improvements in Utilization of Wood

In recent decades, there have been continuing and substantial improvements in the utilization of timber going into primary timber processing industries. The extent of this improvement is illustrated in figure 10.1, which shows that during the period 1950–79 the tonnage of industrial timber products—lumber, plywood, woodpulp, and other industrial timber products—produced per unit of roundwood input in domestic mills rose at an average rate of just under 0.8 percent per year (Append. 1, tables 1.25 and 1.26).

Figure 10.1

Output of Timber Products Per Unit of Roundwood Input, 1950-79



These improvements reflect increased use of slabs, edgings, sawdust, veneer cores, shavings, and other similar material for woodpulp, and particleboard. As a result of the growth in use of such material, and as illustrated in table 10.1 and figure 10.2, nearly all of the wood going into primary processing plants in 1976 was used for some purpose. Wood residues at these plants amounted to only 0.5 billion cubic feet, 4 percent of the wood input. This may well be a practical overall minimum. There probably always will be some unused wood at some primary manufacturing plants because of the low volumes generated at scattered small plants, or the remote location of some plants generating residues relative to consuming plants.

The fact that most of the material entering primary processing plants is utilized does not necessarily indicate an optimal level of conversion. But it does mean that increasing product yields at one point in the processing chain will reduce availability of wood for some other use. The market tradeoffs involved in shifting the use of wood from one product to another need to be carefully considered.

In addition to improved recovery in primary processing plants, there have been increases in the amount of material removed from the forest as techniques and markets have improved. In recent years, rising energy costs have also contributed in a significant way to the increased use of such material for fuel.

Although rapid progress has been made in the utilization of wood resources, there are further opportunities for using more of the wood left in the forests after logging, tree tops and branches, rough and rotten trees, dead trees, trees on noncommercial forest lands (i.e., those incapable of producing more than 20 cubic feet of industrial wood per acre per year), and the wood residues generated in urban areas.

In 1976, about 1.4 billion cubic feet of residues from growing stock was left on logging areas because it was not economically feasible to remove and use it for some purpose. Perhaps two to four times as much volume was left in residual tops and branches, rough and rotten trees, small stems, and other material on harvest sites.[1] These estimates exclude stumps and roots, which may be a potential economic resource in certain areas.[2,3] Mortality from competition, insects, disease, fire, and other destructive agents totaled 4 billion cubic feet in 1976. This included 1 billion cubic feet on National Forests, most of which occurred in the West.[4] As a result of the accumulation of mortality over the years, there was some 14 billion cubic feet of salvable dead timber on commercial timberlands in 1977, largely in western softwoods. In addition to salvable dead timber, there was 23.2 billion cubic feet of rotten trees

[1] See, for example: Keays, J. L. Forest harvesting for the future. AICHE Symp. Ser. 72(157):4–12. 1975.

[2] Koch, Peter. New technique for harvesting southern pines with taproot attached can extend pulpwood resources significantly. *In* Applied Polymer Symp. 28:403–420. John Wiley and Sons, Inc., New York. 1976.

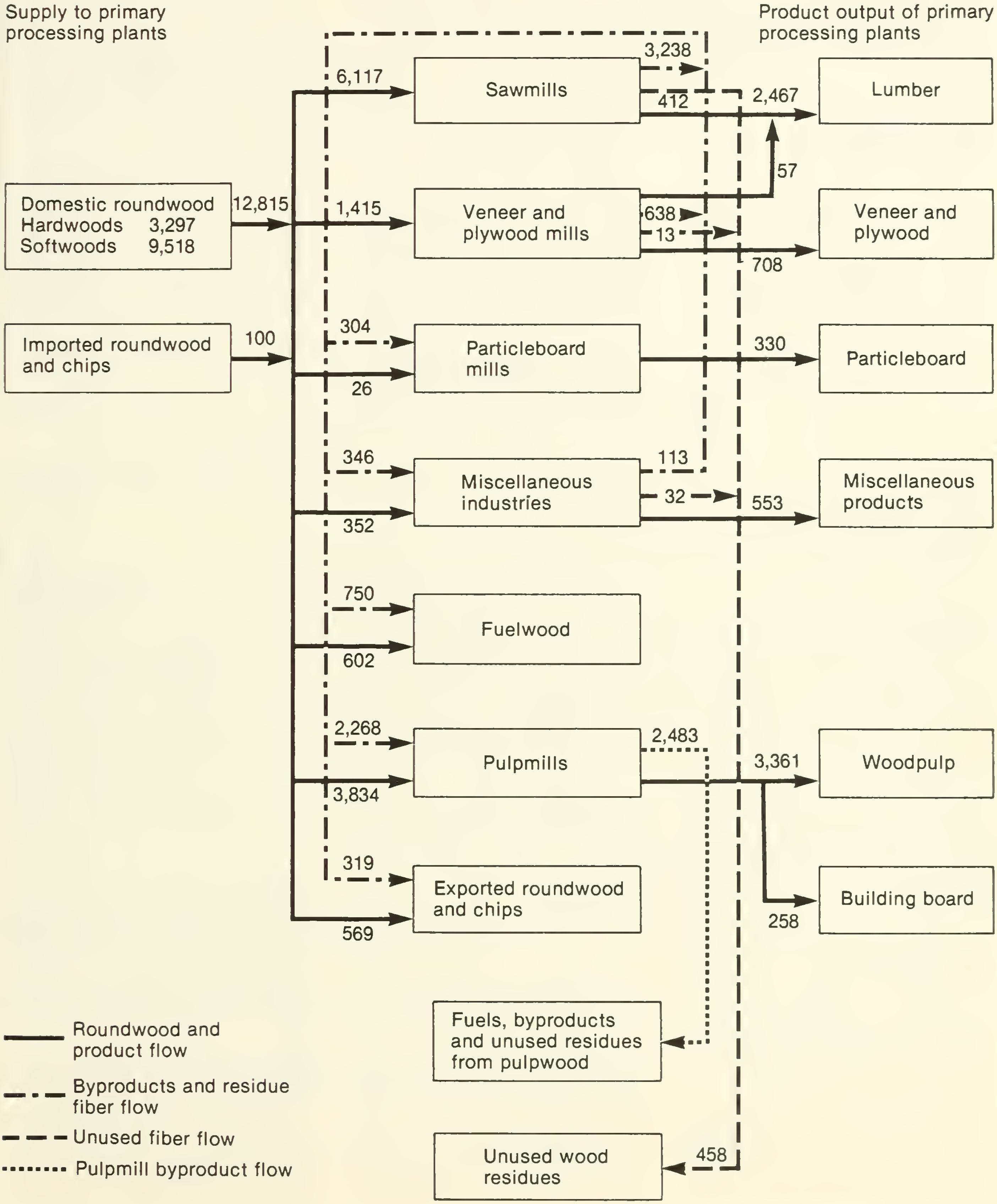
[3] Koch, Peter. Five new machines and six products can triple commodity recovery from southern forests. J. Forestry 76(12):768–772. 1978.

[4] The extent of dead softwood timber in the West and discussion of problems and opportunities for its utilization may be found in proceedings of the May 1978 Symposium: The dead softwood timber resource. Publ. by Engineering Extension Serv., Washington State University, Pullman, Wash. 260 p. 1978. See also, Western forest insect issues study. U.S. Dep. Agric., Forest Serv. Washington, D.C., (Unnumbered) 20 p. 1977.

Figure 10.2

Timber Supply to and Product Output from Primary Processing Plants, 1976

(Million cubic feet)



and 44 billion cubic feet of rough trees on commercial timberlands in 1977.

Over half of the volume of salvable dead trees is on western National Forests as indicated by the volume figures in the tabulation below.

Measured nongrowing-stock inventory on western National Forests, 1977

Region	Rough and rotten *(Billion cubic feet)*	Salvable dead
Pacific Northwest except Alaska	2.8	1.6
Pacific Southwest	0.9	0.2
Northern Rocky Mountain	1.3	4.4
Southern Rocky Mountain	1.7	1.2
Total	6.7	7.4

The greater part of this timber is in unroaded areas and inaccessible by trucks and tractors. Part of it, while accessible, is either so remote from existing processing plants or so scattered through stands, that it is unlikely to be economically usable until new plants are built or lower cost harvesting and transportation systems developed.

In contrast to the salvable dead timber, the rough and rotten timber is predominately hardwoods. This timber is concentrated in the eastern regions and is largely composed of individual trees scattered through the stands. Because of the small volumes per acre and the low quality of the trees, the salvage of this timber is likely to be economically limited until the stand is cut. More and more of it, however, will be utilized for pulp or fuel as the other timber in the stands is harvested.

As described in Chapter 6, there are 229 million acres of forest land that are incapable of producing 20 cubic feet of industrial wood per acre per year that are not included in the commercial timberland base. Although productivity is low, these lands do contain large volumes of timber. The pinyon-juniper, chaparral, and other related forests on dry sites in the Southwest, which compose a third of this area, are important local sources of wood for uses such as fence posts, corral poles, raw material for certain cottage industries, and fuel; and in some areas such use can be expanded. The fir-spruce and hardwood forests in Alaska, which account for nearly half of the 229 mil-

Table 10.1—*Source and utilization of roundwood in primary processing plants in the United States, by softwoods and hardwoods, 1976*

(Million cubic feet, solid wood basis, excluding bark)

Product	Total	Saw logs	Veneer logs and bolts	Pulpwood, roundwood, and whole-tree chips	Pulpwood chip imports	Miscellaneous industrial	Fuelwood
SUPPLY TO PRIMARY PROCESSING PLANTS							
Roundwood products from U.S. forests							
Softwoods	9,518	5,210	1,330	2,608	..	238	132
Hardwoods	3,297	1,432	100	1,155	..	139	470
Total	12,815	6,642	1,430	3,763	..	378	602
Imported roundwood and chips							
Softwoods	91	10	0	20	61	....	...
Hardwoods	9	0	5	3	1	....	...
Total	100	10	5	23	62	....	...
Exported roundwood							
Softwoods	549	535	0	14	..	....	...
Hardwoods	20	0	20	0	..	....	...
Total	569	535	20	14	..	....	...
Total supply to domestic mills							
Softwoods	9,060	4,685	1,330	2,614	61	238	132
Hardwoods	3,286	1,432	85	1,158	1	139	470
Total	12,346	6,117	1,415	3,772	62	378	602
OUTPUT FROM PRIMARY PROCESSING PLANTS							
Lumber							
Softwoods	[1]1,937	[1]1,880	[2]57	.....	..	....	...
Hardwoods	[1]587	[1]587	0	.....	..	....	...
Total	2,524	2,467	57	.....	..	....	...
Plywood and veneer							
Softwoods	665	.....	[3]665	.....	..	....	...
Hardwoods	43	.....	[3]43	.....	..	....	...
Total	708	.....	708	.....	..	....	...
Pulpwood delivered to U.S. mills[4]							
Softwoods	4,577	1,470	417	2,614	61	15	...
Hardwoods	1,525	335	16	1,158	1	15	...
Total	6,102	1,805	433	3,772	62	30	...
Pulpwood chip exports[4]							
Softwoods	319	319	0	....	..	0	...
Hardwoods	0	0	0	....	..	0	...
Total	319	319	0	....	..	0	...

Table 10.1—*Source and utilization of roundwood in primary processing plants in the United States, by softwoods and hardwoods, 1976 cont'd.*

(Million cubic feet, solid wood basis, excluding bark)

Product	Total	Saw logs	Veneer logs and bolts	Pulpwood, roundwood, and whole-tree chips	Pulpwood chip imports	Miscella-neous industrial	Fuelwood
OUTPUT FROM PRIMARY PROCESSING PLANTS							
Particleboard furnish[5]							
Softwoods	290	232	29	.....	..	29	...
Hardwoods	40	32	4	.....	..	4	...
Total	330	264	33	.....	..	33	...
Miscellaneous industrial[6]							
Softwoods	329	172	27	.....	..	130	...
Hardwoods	224	145	2	.....	..	77	...
Total	553	317	29	.....	..	207	...
Fuelwood[7]							
Softwoods	672	368	127	.....	..	45	132
Hardwoods	680	165	15	.....	..	30	470
Total	1,352	533	142	.....	..	75	602
Total of all products							
Softwoods	8,789	4,441	1,322	2,614	61	219	132
Hardwoods	3,099	1,264	80	1,158	1	126	470
Total	11,888	5,705	1,402	3,772	62	345	602
Manufacturing residues							
Softwoods	271	244	8	.....	..	19	...
Hardwoods	187	168	5	.....	..	13	...
Total	458	412	13	.....	..	32	...
Total output							
Softwoods	9,060	4,685	1,330	2,614	61	238	132
Hardwoods	3,286	1,432	85	1,158	1	139	470
Total	12,346	6,117	1,415	3,772	62	378	602

[1]Lumber volume from saw logs estimated at 64.8 cubic feet of solid wood per 1,000 board feet of softwood and 91.4 cubic feet per 1,000 board feet of hardwood lumber.
[2]Lumber volume shown from veneer logs and bolts is from peeled core.
[3]Plywood and veneer volume from veneer logs and bolts estimated at 50 percent of log volume.
[4]Pulpwood volumes shown from products other than pulpwood roundwood are byproducts from sawmilling, veneer and plywood manufacturing, and miscellaneous products manufacturing. Of the total volume of wood delivered to mills some 3.6 billion cubic feet is recovered as woodpulp and 2.5 billion cubic feet is used as fuel.
[5]Particleboard furnished from saw logs and from veneer logs and bolts is a byproduct from primary products manufacturing. Furnish from miscellaneous industrial is roundwood and forest residue volume delivered to particleboard mills.
[6]Miscellaneous industrial volumes from saw logs and from logs and bolts are byproducts from primary manufacturing. Volume from miscellaneous industrial itself is roundwood delivered to miscellaneous industrial products mills.
[7]Fuelwood volumes from saw logs, veneer logs and bolts, and miscellaneous industrial are byproducts from manufacturing. Fuelwood volumes from fuelwood itself are from wood harvested specifically for fuel.
Note: Data may not add to totals because of rounding.

lion acres, also supply wood for local use and have the potential to supply much larger volumes.

Wood materials generated in urban areas constitute a substantial solid waste disposal problem, and at the same time a potential source of increased product supply.[5] The major categories of such materials are paper; solid wood from building construction and building demolition; used pallets, crates and dunnage; and urban tree removals. A recent estimate [6] of annual formation of such materials is as follows:

Item	*Volumes*
	(Billion cubic feet)
Waste paper	1.8
Waste solid wood products	.4
Urban tree removals	.1
	2.3

Recycling and fuel uses consume 20 to 30 percent of the waste paper generated annually in urban areas. Salvage for products or fuel probably accounts for about one-fourth of the solid wood materials and one-seventh of the urban tree removals. The remainder of this material is disposed of in landfills, dumps, or incinerators.

Possibilities for Increased Utilization of Unused Wood Resources. There are a variety of economic, technological, and environmental obstacles to increased use of logging residues, rough and rotten trees, and other kinds of unused wood resources. In most cases, current market prices for such materials are lower than the costs of harvest or collection and transport to mills. Thus a major need is for techniques and equipment that will improve recovery in the woods or otherwise reduce the cost of

[5] Case studies of urban wood wastes are found in a number of reports, such as: Geiger, James R. Utilizing urban tree debris: an analysis of alternatives for Chicago, Ill. U.S. Dep. Agric., Forest Serv., Rep. NAMR-1. 113 p. 1979. See also, Dennison, S. E. and J. S. Mawson. A survey of solid waste disposal facilities in Franklin, Hampden, and Hampshire counties of Massachusetts. Cooperative Extension Service, University of Massachusetts. SP-103, 80 p. 1977. And Vogel, John T. and James T. Mastin. Urban wood residue. Div. of Forestry, Florida Dep. Agric. and Consumer Serv., Tallahassee, Fla., 58 p. 1978.

[6] Carr, Wayne F. Urban wood waste in the United States. Unpubl. rep. to U.S. Dep. Agric., Forest Serv., Forest Prod. Lab. 1978.

Forest lands incapable of producing 20 cubic feet of industrial wood per acre per year and the trees in urban areas, along fence rows, and on homesites are important sources of fuelwood, and in some areas, products such as fence posts and corral poles.

the unused wood at the mill.[7]

Research on mechanized systems that allow rapid collection—and in some cases, onsite chipping for fuel or pulpwood—of whole stems or trees could lead to increased utilization. Aerial systems of logging to reduce road construction needs and to permit harvesting of timber on areas where environmental impacts would otherwise be unacceptable could also contribute.[8]

Studies in both the United States and Canada have shown that quality control during felling and bucking could add several percent to sawlog and veneer log recovery.[9] In addition to improvement in harvesting practices, the development of new manufacturing processes or products could increase utilization. For example, part of the unused wood in forests such as small or short logs could be converted to lumber. Processes for accomplishing this depend upon rapid conversion to lumber, preferably with one pass through gangsaws. Various treatments for upgrading the lumber by defect removal and joining small pieces to produce larger sizes are also possible as described below.

The production of face veneer from unused wood in forests is not practical because of the need for 8-foot, straight logs. However, the production of crossbanding from 4-foot bolts could increase the utilization of more crooked logs, since the amount of crook would be reduced by half.

Processes for producing products with lumber-type and plywood-type properties from low-quality wood are already an industrial reality, and further expansion seems possible. Consolidating flakes and strands into panels produces flakeboards or strandboards that are acceptable as a substitute for plywood in roofs, walls, and floor sheathing.

When generated with length exceeding width, flakes and strands can be easily alined in one direction. It is therefore possible to reconstitute them so as to produce a product with improved structural properties. Both of these reconstituted products have properties that make them superior in some respects to the products now in use.

One way to reduce logging residues and increase timber supplies is through quality control in felling and bucking. Studies in the United States and Canada show that such controls can add several percent to sawlog and veneer log output.

Another relatively new product that could be produced from unused forest resources is medium-density fiberboard. It is composed of fibrous particles similar to insulating board, but requires no water or chemicals other than adhesive and wax. And since this board is produced by an entirely dry process, water pollution problems are minimized.

In considering options for the further utilization of forest resources, it is desirable to maintain flexibility in adjusting to both market conditions and resource conditions. This is essentially what happens in integrated operations that facilitate the allocation of prescribed amounts and kinds of material to optimize returns. A single process that could accept a wide range of material, "homogenize" it, and convert it to several different kinds of products would be a better system.

A major obstacle to increased use of urban wood resources is the cost of collection. Most of the unused wood is of poor form and size, and difficult to handle, load, and haul. But as a general rule, the smaller the solid wood can be reduced in size, the more efficient its handling becomes and the more concentrated a load becomes. Reconstituted products can be made from wood reduced to relatively small pieces, i.e., large chips or stovewood sizes. Thus, the expanded production of reconstituted products could result in increased utilization.

The large volumes of relatively low quality hardwoods in both eastern and western forests present a special utilization challenge because of their great variability in properties and tree characteristics. Since most hardwood stands are the result of natural regeneration, they invariably contain mixed species, and include trees of a form and size that do not lend themselves to conventional processing.

The further development of processes such as press drying of paper could increase the use of the hardwoods. Also, as mentioned earlier, the high flexibility of medium-density fiberboard with respect to raw material makes this product one of the major keys to increased utilization of hardwoods, particularly since it can be made with denser hardwoods that currently have limited uses.

Lower density hardwoods such as aspen, red maple, basswood, gum, tupelo, yellow popular, and alder are readily accepted for flakeboard and strandboard manufacture. Since these products replace traditional softwood products, they tend to reduce demand for relatively scarce softwoods.

Lower density hardwoods could also be used in place of softwood species for structural lumber. In 1978, some 3.9 billion board feet of softwood studs was produced, a substantial portion of which could be replaced with hardwood studs manufactured closer to the market. Hardwood structural materials generally tend to warp exces-

[7] Boyd, Conor W., Ward W. Carson, and Jens E. Jorgensen. Harvesting the forest resource—are we prepared? J. Forestry 75(7): 401–403. 1977.

[8] See, for example: Lefebure, Ed. How improper log bucking reduces lumber revenues. Can. Forest Industries. September, 1978.

[9] See, for example: Sauder, B. J. and M. M. Nagy. Coast logging: Highlead versus long-reach alternative. TR-19, Forest Eng. Res. Inst. of Canada, 51 p. 1977.

sively in drying and have, therefore, been unsatisfactory for this purpose. A process has been developed in which the log is sawed into flitches which are dried and then ripped to width. This simple procedure of reversing the drying and ripping operations produced fully acceptable hardwood studs. Extension of this principle to larger members and a wider range of species could further increase the use of hardwoods.

As a general rule, the utilization of the denser hardwoods for reconstituted products has not been very successful. However, there are some possibilities. A mixture of soft and hard hardwood flakes has been used to produce a plywood-type panel material with acceptable properties. Also, researchers have produced a layered board of oak with the surface strands alined in one direction, and the center strands alined in the perpendicular direction. The resulting thick panel has sufficient strength to span 10-foot stringers and may eventually be produced for thick commercial roof decking.

The principal drawback to the use of dense hardwoods in composite panels is the relatively high weight of the final product and the difficulty of handling. This is a subject of intensive research in several laboratories and some solutions seem imminent. But weight is not a major factor for some products such as railroad crossties, and attempts to produce such products from dense hardwood fibers appear promising. A potential market of 30 million crossties annually (Chapter 3) will provide incentive to produce ties from oriented strands of denser species. Oriented strandboards of dense hardwood species might also find wider application in pallet manufacture. About 300 million pallets are produced annually.

As was shown in Chapter 3, recycling of waste paper is much greater in Japan and some European countries than in the United States. The adoption of similar collection and handling techniques here could lead to significantly higher recycling rates.

As indicated in the preceding tabulation, some 2.3 billion cubic feet, or about a sixth of our total annual consumption of fiber, is generated in urban areas each year and is potentially available for recycling. Most urban recyclable materials have a negative value and are widely scattered, and usually contaminated with metal, plastics, or mineral matter. This makes collection and preparation for reuse rather costly by present technology. Moreover, the material is usually in a dry condition and highly variable in form, size, and species, which constrains every use except fuel. Since most of it is located in urban areas, fuel may be its best use.

Utilization of urban solid wood residues, apart from salvaging lumber and plywood as whole pieces, would appear to require innovative reduction processes. The wood element produced would then most likely be splinter-like in geometry, and suitable mainly for composite products or fuel.

Further research, however, might result in techniques for producing orientable elements, which then might qualify for high-quality structural products. The mix of species would remain a problem and would require a process that is able to overcome the problem of variability. Additional developments of this kind, especially if they can be scaled down to local conditions, are necessary to more fully utilize the recyclable material. Eventually, consideration might be given to those factors which affect the efficiency of reprocessing. In the case of paper, for example, different color inks, resins, and fillers add to the difficulty of producing pulp from used paper. The reduction of chemical loading of paper could result in higher vaue waste paper for recycling.

Possibilities for Improved Processing Techniques. One of the important ways of improving the utilization of the timber removed from the forests is to increase product yields from each unit of wood input. This has long been recognized and has been a primary goal of much research and various Federal and State technical assistance programs. As a result, a wide array of technological improvements has been developed and put into practice in the processing industries.

In a total sense, these improvements have been successful since about 96 percent of the wood going into primary processing plants is used in some form. However, for some products, particularly lumber, plywood, and woodpulp, average yields per unit of wood input have not changed significantly in recent decades. In the lumber industry, there have been many technological changes that increase yields; but these apparently have been offset by the use of smaller and lower quality timber and the spreading use of equipment such as chipping headrigs, where lumber yields are lower. There have also been many technological improvements in the pulp industry, but these have been offset by a large rise in the production of bleached and semibleached pulps, which requires more wood per ton of production.[10]

Although there have been no increases in average yields of some major products in recent decades, it was assumed in this study that product yields—lumber, veneer, and woodpulp—would rise by 10 percent by 2030 (see discussion, page 69 of Chapter 3). However, much larger increases in yields are attainable with further research and development.

For example, quality control in sawmilling offers an immediate opportunity for increasing lumber recovery.[11] The rough lumber produced by headsaws has only limited use in construction and manufacturing. For many products, a subsequent planing operation is necessary to provide the precise thicknesses and smoothness needed. The amount of wood removed is a direct function of how accurately the initial cut was made. In producing 1-inch lumber, every hundredth of an inch going into planer shavings or sawdust is equivalent to a 1 percent loss in lumber.

A wobbly or poorly set or sharpened saw can easily result in an additional 5 to 10 percent of the log going into sawdust or planer shavings—wood that might otherwise have been lumber. Development of means of stabilizing thinner saws to cut more accurately would have a direct impact on yield of lumber. Increased use of high-speed electronic scanning and automated control system also could result in significant increases in lumber yields, perhaps as much as 15 percent. Therefore, an immediate improvement in yield could come from an expanded effort to transfer existing mill technology to mill operators.

After the lumber has been cut, there are three further opportunities to increase yield before it leaves the mill: end trimming, edge trimming, and seasoning. Loss due to end trimming begins in the woods with the bucking operation, and is compounded in the mill by trimming to definite increments of length. For example, a softwood log that is an inch too short of a standard length can create a further loss of as much as 23 inches at the trim saw.

[10] A comprehensive statement of technological problems and opportunities is found in: Tech. Assn. of Pulp and Pap. Ind. Future technical needs and trends in the paper industry—III. Report of Future Technical Needs and Trends Committee of the Board of Directors. Robert W. Hagemeyer, Editor. TAPPI Press, Atlanta, 92 p. 1979.

[11] Williston, Ed. State-of-the-art: Lumber manufacture. Forest Prod. J. 29(10):45–49. 1979.

Similar considerations in the mill apply to edge trimming where lumber is ripped to 1- or 2-inch-width increments. An average loss of ¼ to ½ inch per board could amount to a 5 to 10 percent loss of lumber.

These edge trim losses could be reduced by a process by which the boards are dried without edging, edged to maximum width, edge glued, and then ripped into desired widths. This process could result in a 10 percent increase in yield measured over conventional processing. In addition, the process provides an opportunity for producing wider boards from smaller logs, thus extending the possibility of recovering lumber from otherwise unsuitable timber.

An extension of the edge gluing system could save end trim losses as well as permit longer lumber from shorter logs, and compensate for poor bucking practices. This would involve deferring end trimming until after drying, then end joining to produce an endless ribbon of lumber which then can be cut to the exact lengths desired. Trimming out defects before end joining can produce a higher grade of lumber.

A related possibility, the serpentine joint, shows promise of upgrading small pieces of fine furniture woods such as walnut. In this process, the ends of the lumber to be joined are first formed to the geometry of an ellipse, male and female. After joining, the joint line resembles the loops formed by annual rings and is unnoticeable. These processes could increase the yield and value of lumber from small and short logs.

There are two additional possibilities related to these upgrading processes. One involves the conversion of short low-grade hardwood logs to lumber that will later be resawn for high-value clear cuttings. The other addresses the problem created by the thousands of different size cuttings demanded in hardwood utilization. The variability in sizes tends to reduce conversion efficiency and increase lumber losses at any one manufacturing facility. By promoting greater cooperation among users to adopt common sizes, the industry could achieve a smaller, more manageable cutting schedule. The production of dimensioned parts could then be centralized and computerized to produce maximum yield from incoming lumber.

Proper seasoning of lumber provides an opportunity not only to improve yield, but also to improve performance of wood in subsequent processing and in service. Improved yield arises because of reduced losses due to checking, splitting, staining, honeycombing, and warping that can occur as a result of improper drying procedures. Losses as high as 15 percent have occurred, particularly in drying such species as oak without sufficient control of the process.

Perhaps of even greater importance is the effect of improper seasoning practices upon performance of wood. The moisture content of wood, and particularly changes in moisture content during and after fabrication, have important effects upon the load-carrying characteristics of wood, how well it machines, glues, and finishes, its dimensional and shape stability, and its resistance to decay. A high proportion of complaints with respect to performance of wood can be traced to improper seasoning. Since much of the technology is available for preventing these problems, an expanded technical assistance effort to acquaint users with this information could provide an immediate benefit.

Beginning in 1905 with gluing together thin veneers in perpendicular directions to form plywood, there has been a continuous stream of innovations in the plywood industry. The latest includes methods of peeling small logs, the development of adhesive to effectively glue southern pine veneer, and veneer overlayed strandboard core mentioned earlier.

Veneer yield and quality is a dominant factor in plywood manufacturing costs.[12] The cutting edge of the knife used in peeling veneer is a major determinant of quality and yield. Sharpness and stability of the knife influence thickness uniformity, a factor controlling not only yield but also quality of surface, the latter in turn influencing the performance of the adhesive. Since maintaining close tolerances is a key to yield, the condition of the machinery reflects upon conversion efficiency. As in sawing lumber, equipment maintenance is the first step toward improved utilization in converting logs to plywood. In cutting one-tenth-inch veneer, for example, every one-thousandth of an inch that can be shaved from the average that must be included in the settings to account for thick and thin areas and compression and sanding losses, represents a 1 percent gain in yield. Since the amount of sanding, and to a certain extent the amount of compression, depends upon the quality of cutting, the knife edge on veneer lathes is a critical point for improving veneer recovery.

Increased veneer log yields have come from improvements that allow peeling to a smaller core diameter. It is estimated that yields can be increased by 7-8 percent by the adoption of these new techniques. But since this results in the production of veneer with more defects, the ability to utilize this veneer has been limited. Means of repairing larger defects at a faster rate could extend veneer recovery.

Increased use of precisely sized, one-piece veneers, assembled by use of stitching or gluing string over the surfaces of veneer pieces, would also result in increased yields. This reduces the overhang that results from assembling random-width veneer at the glue spreader. At this point, every inch of veneer saved represents 1 percent gained, plus 1 percent savings in adhesive that otherwise would be discarded on the overhang. A 2- to 5-percent savings is a reasonable expectation in some operations. In addition to saving veneer and adhesive, the practice of using one-piece plies reduces labor, reduces breakage, and speeds up the assembly process. The latter will also allow the use of faster setting adhesives when they are developed.

Improvements in adhesives, which control both the rate of production and the performance of the product, can reduce costs and extend timber supplies.[13] Phenolic and urea formaldehyde resins are normally used to bond veneer, phenolics for softwood plywood, and ureas for hardwood plywood. Since they are petrochemical based, phenolic resins are of uncertain supply and price, a fact that could hinder the development of improved bonded products. Development of adhesives from wood residues, bark, or lignin could improve the supply situation.

When properly used, plywood performs up to standards. But plywood is not always properly used. Delamination results and costly replacements must be made. Often the cause is a mistaken use of plywood made with water-degradable glues in an exterior environment. Such losses could be lowered by producing only plywood made with moisture-resistant glues. This would reduce plywood failure and improve opportunities for salvage and reuse in later years.

In the pulp sector, the further development of new pulp and paper pro-

[12] Walser, D. C. New developments in veneer peeling. Reprint from Modern Plywood Tech., Vol. 6. Miller Freeman Publ., Inc., San Francisco, 12 p. 1978.

[13] The influence of adhesives cost in the forest products industries is described in White, James T., Growing dependency of wood products on adhesives and other chemicals. Forest Prod. J. 29(1):14–20. 1979.

cessing techniques, such as press drying of paper, could have a significant effect on product yields. This process also permits the use of a wider range of species and processes with higher pulp yields.

The reduction of fuel and power costs in forest industries could lower per-unit manufacturing costs and thus increase economic supply of products. Possibilities include development of energy-efficient processing methods and expanded use of wood and bark fuels. Many mills already have turned to fuels from manufacturing residuals and a few are harvesting low-grade roundwood or chips specifically for fuel. Improvement in techniques for harvesting, processing, and storing fuelwood could help expand such use. Another possibility, now applied in a few areas, is distribution of surplus steam and electricity from forest products mills through local utilities. This arrangement can reduce the net cost of energy to the mills.

Reducing the Demand for Timber Products Through Improved Product Performance

Beyond the opportunities to increase and extend timber supplies, there is another set of opportunities—those that will reduce demand for timber through: (1) Improving the design of structures and manufactured products; (2) increasing the service life of wood products and structures by treatment with chemicals to increase resistance to decay, fire, insects, or dimensional change; and (3) better upkeep, and improvements.

Most wood structures are overdesigned from an engineering standpoint. For example, it has been estimated that improved engineering and construction practices could save 10 to 20 percent of the dimension lumber required in a conventional house with no loss in performance.[14] Overdesign is partly due to tradition and overly restrictive building codes, and partly due to the need to design according to the weakest piece of wood likely to occur in the grade. Except for those weakest pieces, perhaps only 5 percent of the total, the rest of the building is overdesigned.

Processes are available for measuring the strength of lumber without breaking it. Nondestructive testing procedures are sufficiently rapid so that every piece of structural lumber can be measured and stamped with a strength value guaranteeing its load-carrying performance. The process is principally used in selecting timber for laminated beams and arches, and for trusses, ladders, and scaffolding. The extension to other building components such as joists could have a significant impact on the design of structures, and reduce the amount of wood needed for a given building.

The truss framing system is another way of reducing the amount of structural lumber required in light frame construction. It is estimated that a savings of 20 percent in the amount of wood needed to frame a house could be made if this system was adopted. The method ties together a roof truss and a floor truss with a stud at each end. One such frame forms the entire cross section of a house. It is so unitized that each member of the truss shares the load from the others, thus reducing the need for large-size pieces. The entire frame is made of 2 by 4's, thus eliminating the need for larger size lumber. As a fringe benefit, the trusses can be prefabricated, and thus it is possible to erect and enclose a house in one day.

Another method of reducing the amount of wood in a building is based upon the I-beam principle. The I-beam is one of the most materials-efficient structures for carrying loads in bending. The use of glue in many common nailed constructions immediately induces the I-beam effect. For example, the use of adhesives onsite to bond floor sheathing to floor joists unitizes the two components and markedly increases the stiffness. This means that for the same stiffness, less wood needs to be used or a longer span can be bridged. The procedure has been used to make floors stiffer and less squeaky, but it could be used more widely to reduce the amount of wood used in construction.

The I-beam effect can be used in the production of wall, floor, and roof sections, becoming a stressed skin construction with rather dramatic material savings. Stressed skin panels can be designed to permit fabrication of entire structures. Windows and doors are built into single sections; erection is accomplished by simply joining sections. When the sections are prefabricated under factory conditions, the exact amount of wood can be calculated and dimensioned for the intended loads, and the section built accordingly. The prefabrication of sections in this manner offers one of the best opportunities for reducing wood consumption in houses.

In well-designed stressed skin sections, where a strong material such as plywood forms the skins (outer surfaces), insulation can be incorporated and even made to function as part of the structure. In this case, structural integrity is achieved without the use of structural lumber. Taking one more step, substituting flakeboard or strandboard for the plywood skins and webs would make it possible to construct a house with a minimum of wood and with limited high-quality timber. The time is near when a conventional house can be constructed without the use of structural lumber as now known.

In Chapter 3, which examines the demand for new housing, it is estimated that by the turn of this century about half of the new housing units will be constructed as replacements for existing units. Consequently, techniques that improve the performance of buildings and extend the life of the structure can have a major impact on demands for timber products.

A major cause of reduced service life of wood structures is improper construction practices and especially those relating to the control of moisture. Moisture that enters a structure unplanned can reduce the natural durability of wood. Proper installation of flashing and vents can prevent the accumulation of moisture and greatly extend service life.

In addition to improved construction techniques, certain elements in houses could be made less vulnerable to moisture. For example, expanded use of preservatives could greatly lower the incidence of moisture induced decay of wood components in structures. There

Proper use of preservative-treated products and careful application of water repellants can greatly extend the life of wood structures and lower replacement demands.

[14] Saeman, Jerome R. Solving resource and environmental problems by the more efficient utilization of timber. *In* Report of the President's Advisory Council on Timber and the Environment. Appendix K. p. 347–368. 1973.

is a related need to determine better ways of controlling the effect of ambient moisture vapor surrounding all structures. With the advent of improved insulation, moisture barriers, tighter houses, and air-conditioning, it is difficult to know the origin of moisture, much less what to do about it. Major studies are needed to provide answers for controlling moisture in the home.

The amount of plywood in construction could be reduced by increasing the use of moisture resistant plywoods. As indicated above, it appears that many users do not understand the difference between the glues used in interior and exterior types of plywood; or if they do, they mistake exterior conditions for interior conditions. The production of only exterior types of plywood—with moisture-resistant glues—would prevent this type of misuse. The main obstacle is the higher cost of the moisture-resistant glues. Adhesive research to find alternatives to petrochemicals is a necessary prerequisite to an improvement of this nature.

Requirements for timber products could also be reduced by expanded treatment with chemicals to improve resistance to fire, insects, and dimensional change. While such treatment is well-established, wider application could extend service life of most structures.

One of the chief obstacles to increased treatment of wood (in addition to cost of the chemicals) is the difficulty of impregnating wood with chemicals. Environmental concerns that constrain the use of chemicals are another obstacle. This is likely to become increasingly important, and it seems clear that greater resources must be devoted to:

1. Education of builders in construction procedures which minimize hazards.

2. Development of nontoxic or less toxic chemicals.

3. Development of improved methods for impregnating wood. In this regard, it should be noted that the processes of reconstituting lumber and panels from small wood elements provide opportunities for greatly simplifying treating operations.

Summary

The above discussion has shown that there are opportunities to greatly extend timber supplies and reduce the quantity of timber needed to meet needs. Much of the knowledge needed to accomplish these ends is available and could be put into use. Expanding various Federal and State technical assistance and educational programs seems to be the best way of attaining a broader application of this knowledge.

Research to develop additional knowledge will lead to many new opportunities. And it is from these opportunities that the greatest improvements may come. Increased attention to ways of extending wood supplies and reducing timber products requirements is essential to long-term success in living within resource constraints. The opportunities discussed in this chapter suggest that technologies are available, or could be made available, to greatly reduce the potential adverse impacts of rising prices of timber products and alleviate possible shortages of nonrenewable resources including fossil fuels.

Appendix 1

Timber Product Price, Production, Trade and Consumption Statistics of the U.S.

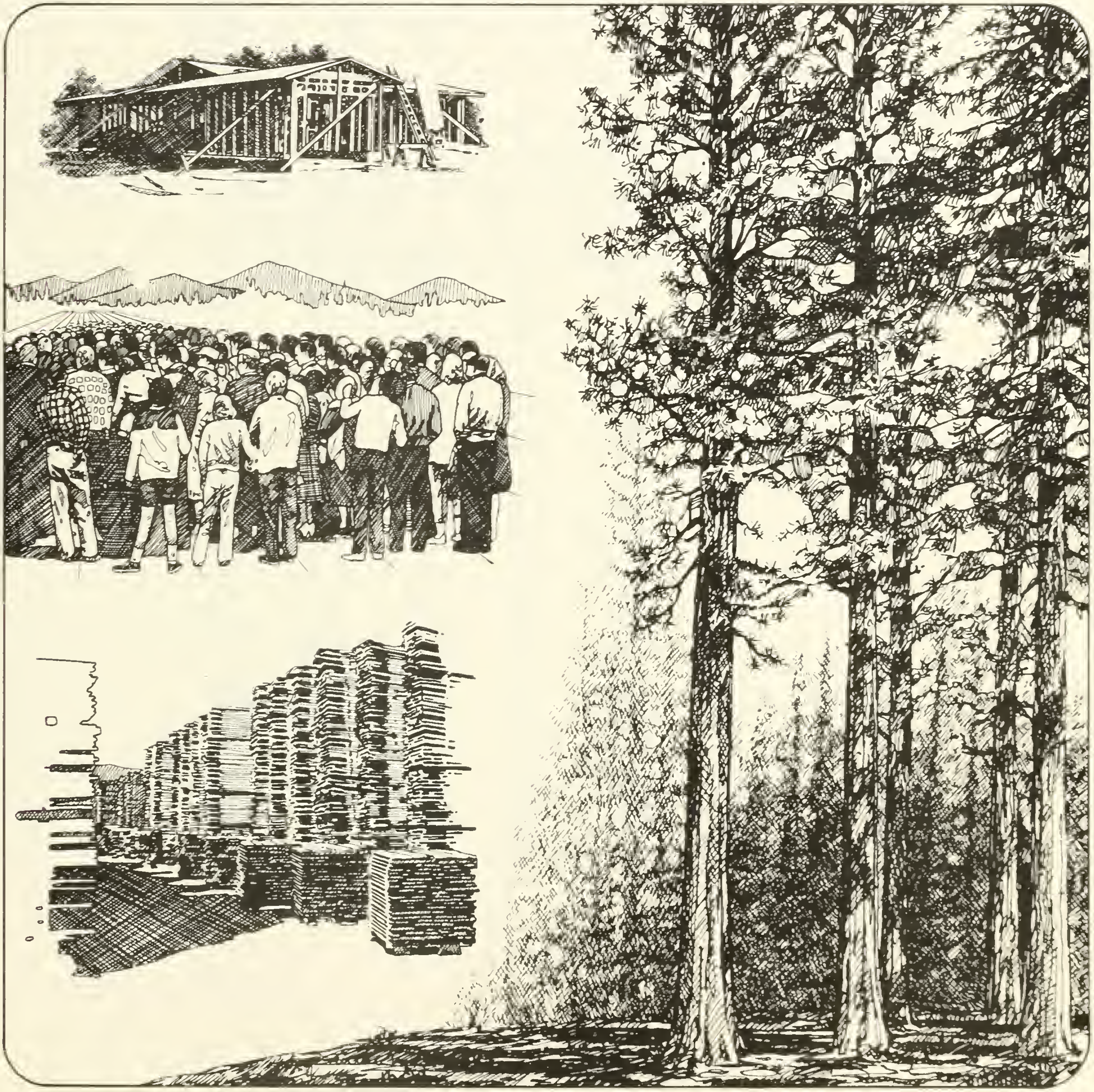


Table 1.1—*Measures of population and economic growth in the United States, 1920–79*

Year	Population	Gross national product: Total	Gross national product: Per capita	Disposable personal income: Total	Disposable personal income: Per capita	Index of manufacturing production
	Millions	*Billion 1972 dollars*	*1972 dollars*	*Billion 1972 dollars*	*1972 dollars*	*1967=100*
1920	106.5	.....	.....	.....	.....	15.3
1921	108.5	.....	.....	.....	.....	11.6
1922	110.0	.....	.....	.....	.....	15.2
1923	111.9	.....	.....	.....	.....	17.8
1924	114.1	.....	.....	.....	.....	16.7
1925	115.8	.....	.....	.....	.....	18.6
1926	117.4	.....	.....	.....	.....	19.6
1927	119.0	.....	.....	.....	.....	19.5
1928	120.5	.....	.....	.....	.....	20.5
1929	121.8	314.6	2,583	229.8	1,886	22.8
1930	123.2	.....	.....	.....	.....	18.7
1931	124.1	.....	.....	.....	.....	15.3
1932	124.9	.....	.....	.....	.....	11.8
1933	125.7	222.1	1,767	169.7	1,350	14.0
1934	126.5	.....	.....	.....	.....	15.3
1935	127.4	.....	.....	.....	.....	18.0
1936	128.2	.....	.....	.....	.....	21.5
1937	129.0	.....	.....	.....	.....	23.4
1938	130.0	.....	.....	.....	.....	18.0
1939	131.0	318.8	2,434	230.1	1,756	21.5
1940	132.6	343.3	2,589	244.3	1,849	25.4
1941	133.9	398.5	2,976	278.1	2,084	32.4
1942	135.4	460.3	3,400	317.3	2,353	37.8
1943	137.3	530.6	3,865	332.2	2,429	47.0
1944	138.9	568.6	4,094	343.9	2,485	50.9
1945	140.5	560.0	3,986	338.6	2,420	42.6
1946	141.9	476.9	3,361	332.4	2,351	35.3
1947	144.7	468.3	3,236	318.8	2,212	39.4
1948	147.2	487.7	3,313	335.5	2,288	40.9
1949	149.8	490.7	3,276	336.1	2,253	38.7
1950	152.3	533.5	3,503	361.9	2,386	45.0
1951	154.9	576.5	3,722	371.6	2,408	48.6
1952	157.6	598.5	3,798	382.1	2,434	50.6
1953	160.2	621.8	3,881	397.5	2,491	55.2
1954	163.0	613.7	3,765	402.1	2,476	51.5
1955	165.9	654.8	3,947	425.9	2,577	58.2
1956	168.9	668.8	3,960	444.9	2,643	60.5
1957	172.0	680.9	3,959	453.9	2,650	61.2
1958	174.9	679.5	3,885	459.0	2,636	57.0
1959	177.8	720.4	4,052	477.4	2,696	64.2
1960	180.7	736.8	4,077	487.3	2,697	65.4
1961	183.7	755.3	4,112	500.6	2,725	65.6
1962	186.5	799.1	4,285	521.6	2,796	71.5
1963	189.2	830.7	4,391	539.2	2,849	75.8
1964	191.9	874.4	4,557	577.3	3,009	81.0
1965	194.3	925.9	4,765	612.4	3,152	89.7
1966	196.6	981.0	4,990	643.6	3,274	97.9
1967	198.7	1,007.7	5,071	669.8	3,371	100.0
1968	200.7	1,051.8	5,241	695.2	3,464	106.4
1969	202.7	1,078.8	5,322	712.3	3,515	111.0

Table 1.1—*Measures of population and economic growth in the United States, 1920–79—Cont'd.*

Year	Population	Gross national product		Disposable personal income		Index of manufacturing production
		Total	Per capita	Total	Per capita	
	Millions	*Billion 1972 dollars*	*1972 dollars*	*Billion 1972 dollars*	*1972 dollars*	*1967=100*
1970	204.9	1,075.3	5,248	741.6	3,619	106.4
1971	207.1	1,107.5	5,348	769.0	3,714	108.2
1972	208.8	1,171.1	5,609	801.3	3,837	118.9
1973	210.4	1,235.0	5,870	854.7	4,062	129.8
1974	211.9	1,217.8	5,747	842.0	3,973	129.4
1975	213.6	1,202.3	5,629	859.7	4,025	116.3
1976	215.2	1,273.0	5,915	891.8	4,144	130.3
1977	216.9	1,340.5	6,180	929.5	4,285	138.4
1978	218.7	1,399.2	6,398	972.5	4,447	146.8
1979[1]	220.6	1,431.6	6,490	995.3	4,512	153.2

[1]Preliminary.

Sources: Population: U.S. Department of Commerce, Bureau of the Census. *Population estimates and projections.* Curr. Pop. Reps. Ser. P-25. 1920–69—"Estimates of the population of the United States and components of change: 1940 to 1978." No. 802, 1979. 1970–79—"Estimates of the population of the United States to October 1, 1980." No. 894, 1980.
Gross national product: Council of Economic Advisers. *Economic report of the President.* January 1980.
Disposable personal income: Council of Economic Advisers. *Economic report of the President.* January 1980.
Index of manufacturing production: U.S. Federal Reserve System, Board of Governors. Fed. Reserve Bull. Monthly.

Table 1.2—*Average stumpage prices for sawtimber sold from National Forests in the United States, by selected species and years, 1920–79*

(Dollars per thousand board feet)

Year	Softwoods								Hardwoods					
	Douglas-fir[1]		Southern pine[2]		Ponderosa pine[3]		Western hemlock[4]		All eastern hardwoods[5]		Oak, white, red, and black[5]		Maple[5]	
	Current dollars	*1967 dollars*[6]	*Current dollars*	*1967 dollars*[6]	*Current dollars*	*1967 dollars*[6]	*Current dollars*	*1967 dollars*[6]	*Current dollars*	*1967 dollars*[6]	*Current dollars*	*1967 dollars*[6]	*Current dollars*	*1967 dollars*[6]
1920	1.80	2.30	4.40	5.50	3.70	4.60	.....	.....	.....	.....	.....	.....	.....	.....
1925	2.10	3.90	3.20	6.00	3.60	6.80	.....	.....	.....	.....	.....	.....	.....	.....
1930	3.30	7.40	3.20	7.20	3.60	8.10	.....	.....	.....	.....	.....	.....	.....	.....
1935	1.70	4.10	4.50	10.90	2.40	5.80	.....	.....	.....	.....	.....	.....	.....	.....
1940	2.30	5.70	4.50	11.10	2.20	5.40	.....	.....	.....	.....	.....	.....	.....	.....
1945	5.00	9.20	9.30	17.00	5.60	10.30	.....	.....	.....	.....	.....	.....	.....	.....
1950	16.40	20.00	26.70	32.60	18.30	22.40	.....	.....	.....	.....	.....	.....	.....	.....
1951	25.40	27.90	34.60	38.00	33.60	36.90	.....	.....	.....	.....	.....	.....	.....	.....
1952	25.80	29.10	38.50	43.50	27.40	30.90	.....	.....	.....	.....	.....	.....	.....	.....
1953	20.20	23.10	34.20	39.10	25.90	29.60	.....	.....	.....	.....	.....	.....	.....	.....
1954	16.20	18.50	29.70	33.90	27.20	31.10	.....	.....	.....	.....	.....	.....	.....	.....
1955	28.90	32.90	32.00	36.40	26.10	29.70	.....	.....	.....	.....	.....	.....	.....	.....
1956	37.70	41.60	37.40	41.20	27.20	30.00	.....	.....	.....	.....	.....	.....	.....	.....
1957	26.20	28.10	31.50	33.80	24.20	25.90	.....	.....	.....	.....	.....	.....	.....	.....
1958	21.80	23.00	31.10	32.90	19.10	20.20	6.30	6.70	.....	.....	16.30	17.20	.....	.....
1959	36.80	38.80	35.20	37.10	20.60	21.70	11.10	11.70	21.10	22.30	21.40	22.60	31.90	33.60
1960	32.00	33.70	34.50	36.40	19.10	20.10	10.50	11.10	22.80	24.00	23.40	24.70	35.00	36.90
1961	27.60	29.20	26.80	28.40	12.10	12.80	9.70	10.30	18.00	19.00	15.70	16.60	26.80	28.40
1962	24.80	26.20	26.00	27.40	16.10	17.00	8.90	9.40	18.60	19.60	17.00	17.90	27.50	29.00
1963	27.90	29.50	25.10	26.60	15.80	16.70	10.40	11.00	21.50	22.80	15.70	16.60	35.30	37.40
1964	38.10	40.20	27.80	29.40	19.00	20.10	13.30	14.00	22.50	23.80	18.00	19.00	30.60	32.30
1965	42.60	44.10	31.70	32.80	19.80	20.50	19.10	19.80	25.00	25.90	21.30	22.00	31.90	33.00
1966	50.00	50.10	38.60	38.70	19.80	19.80	20.50	20.50	29.30	29.40	23.20	23.20	40.90	41.00
1967	41.70	41.70	38.30	38.30	22.20	22.20	21.80	21.80	27.00	27.00	16.80	16.80	46.80	46.80
1968	61.20	59.70	42.20	41.20	30.20	29.50	35.60	34.70	23.60	23.00	17.30	16.90	31.30	30.50
1969	82.20	77.20	51.70	48.50	71.00	66.70	45.10	42.30	30.20	28.40	28.20	26.50	41.10	38.60
1970	41.90	38.00	44.10	39.90	32.10	29.10	20.50	18.60	26.90	24.40	26.60	24.10	34.40	31.20
1971	49.00	43.00	52.20	45.80	37.60	33.00	20.60	18.10	24.60	21.60	21.20	18.60	37.80	33.20
1972	71.70	60.20	65.60	55.10	65.80	55.20	49.00	41.10	34.30	28.80	26.60	22.30	59.40	49.90
1973	138.10	102.50	93.40	69.30	92.30	68.50	99.20	73.60	46.00	34.10	43.60	32.40	71.40	53.00
1974	202.40	126.40	76.20	47.60	100.60	62.80	110.80	69.20	45.90	28.70	54.70	34.20	79.50	49.70
1975	169.50	96.90	57.00	32.60	71.20	40.70	68.80	39.30	33.90	19.40	29.70	17.00	39.60	22.60
1976	176.20	96.30	87.00	47.50	101.80	55.60	79.70	43.60	34.90	19.10	43.40	23.70	36.60	20.00
1977	225.90	116.30	100.30	51.60	131.40	67.70	89.30	46.00	37.90	19.50	60.00	30.90	42.10	21.70
1978	250.30	119.60	134.50	64.30	164.70	78.70	113.60	54.30	41.10	19.60	59.20	28.30	57.40	27.40
1979[7]	394.40	167.40	155.20	65.90	239.00	101.40	200.80	85.20	46.80	19.90	68.80	29.20	33.90	14.40

[1]Western Washington and western Oregon, average prices for the years 1950–56 include Bureau of Land Management timber sales.
[2]Southern Region.
[3]Pacific Southwest Region (formerly called California Region). Includes Jeffrey pine.
[4]Pacific Northwest Region.
[5]Eastern and Southern regions.
[6]Derived by dividing the price in current dollars by the Bureau of Labor Statistics producer price index of all commodities (1967=100).
[7]Preliminary.

Note: All Forest Service National Forest prices in this table are the bid prices (including KV payments) for timber sold on a Scribner Decimal C log rule basis, except in the Northeastern States where International ¼-inch log rule is used. Prices exclude timber sold by land exchanges and from land utilization project lands.

Source: U.S. Department of Agriculture, Forest Service. *The demand and price situation for forest products.* Annual.

Table 1.3—Relative[1] producer price index of lumber in the United States, 1800–1979

(1967=100)

Year	All lumber	Year	All lumber	Year	All lumber	Year	All lumber	Year	All lumber	Year	All lumber
1800	6.4	1830	11.2	1860	20.5	1890	30.2	1920	53.8	1950	105.9
1801	6.6	1831	11.2	1861	19.9	1891	29.7	1921	46.0	1951	102.9
1802	8.0	1832	11.1	1862	18.2	1892	30.9	1922	51.6	1952	103.0
1803	6.8	1833	11.6	1863	17.4	1893	30.5	1923	56.0	1953	103.5
1804	6.8	1834	12.8	1864	17.4	1894	33.7	1924	51.0	1954	101.5
1805	7.0	1835	11.3	1865	16.2	1895	31.5	1925	49.1	1955	107.6
1806	7.1	1836	10.3	1866	20.3	1896	33.2	1926	48.8	1956	106.4
1807	7.6	1837	14.7	1867	21.6	1897	32.2	1927	47.7	1957	97.4
1808	7.4	1838	15.4	1868	22.3	1898	32.5	1928	45.4	1958	94.6
1809	7.0	1839	14.6	1869	21.8	1899	33.3	1929	48.1	1959	101.7
1810	6.5	1840	16.1	1870	22.3	1900	34.4	1930	48.2	1960	97.0
1811	6.5	1841	16.7	1871	23.6	1901	35.0	1931	46.5	1961	92.5
1812	6.1	1842	16.5	1872	24.0	1902	34.3	1932	44.0	1962	93.9
1813	5.5	1843	16.2	1873	24.4	1903	36.3	1933	52.4	1963	96.5
1814	4.7	1844	17.0	1874	24.1	1904	33.9	1934	54.9	1964	98.1
1815	8.2	1845	18.8	1875	23.0	1905	36.0	1935	49.9	1965	97.3
1816	9.1	1846	17.7	1876	23.6	1906	42.6	1936	52.5	1966	100.3
1817	8.0	1847	17.1	1877	23.8	1907	40.6	1937	56.4	1967	100.0
1818	7.5	1848	17.9	1878	23.8	1908	38.9	1938	54.3	1968	114.5
1819	8.6	1849	18.1	1879	25.5	1909	36.2	1939	58.8	1969	123.6
1820	9.6	1850	19.0	1880	24.8	1910	34.4	1940	63.7	1970	103.0
1821	9.5	1851	18.3	1881	26.6	1911	36.9	1941	68.3	1971	119.3
1822	9.0	1852	20.1	1882	27.0	1912	37.3	1942	65.6	1972	133.8
1823	9.7	1853	19.4	1883	26.8	1913	38.9	1943	66.6	1973	152.3
1824	9.8	1854	19.0	1884	28.7	1914	37.0	1944	71.8	1974	129.4
1825	10.2	1855	20.0	1885	29.4	1915	35.3	1945	71.2	1975	110.1
1826	10.9	1856	20.5	1886	30.3	1916	32.4	1946	71.7	1976	127.3
1827	11.0	1857	21.1	1887	30.4	1917	30.9	1947	93.5	1977	142.4
1828	11.5	1858	21.0	1888	29.6	1918	32.1	1948	98.1	1978	154.0
1829	11.4	1859	20.5	1889	29.6	1919	41.1	1949	94.4	1979[2]	150.4

[1]Derived by dividing the actual price index by the all commodities price index.
[2]Preliminary.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Labor, Bureau of Labor Statistics. *Producer prices and price indexes.* Annual Supp.; Cornell University Agricultural Experiment Station. *Wholesale prices for 213 years, 1702 to 1932.* Memoir 142, Pt. I, table 49, pp. 107-119. 1932.

Table 1.4—*Producer price indexes of selected timber products and competing materials in the United States, 1926–79*
(1967=100)

Year	All commodities	Lumber and wood products		Lumber		Softwood lumber		Hardwood lumber		Softwood plywood		Hardwood plywood	
		Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]
1926	51.6	26.5	51.4	25.2	48.8	.....	.....	.....	.....	.....	.....	.....	.....
1927	49.3	25.0	50.7	23.5	47.7	.....	.....	.....	.....	.....	.....	.....	.....
1928	50.0	24.1	48.2	22.7	45.4	.....	.....	.....	.....	.....	.....	.....	.....
1929	49.1	25.0	50.9	23.6	48.1	.....	.....	.....	.....	.....	.....	.....	.....
1930	44.6	22.9	51.3	21.5	48.2	.....	.....	.....	.....	.....	.....	.....	.....
1931	37.6	18.6	49.5	17.5	46.5	.....	.....	.....	.....	.....	.....	.....	.....
1932	33.6	16.0	47.6	14.8	44.0	.....	.....	.....	.....	.....	.....	.....	.....
1933	34.0	19.0	55.9	17.8	52.4	.....	.....	.....	.....	.....	.....	.....	.....
1934	38.6	22.3	57.8	21.2	54.9	.....	.....	.....	.....	.....	.....	.....	.....
1935	41.3	21.4	51.8	20.6	49.9	.....	.....	.....	.....	.....	.....	.....	.....
1936	41.7	22.4	53.7	21.9	52.5	.....	.....	.....	.....	.....	.....	.....	.....
1937	44.5	26.5	59.6	25.1	56.4	.....	.....	.....	.....	.....	.....	.....	.....
1938	40.5	24.1	59.5	22.0	54.3	.....	.....	.....	.....	.....	.....	.....	.....
1939	39.8	24.8	62.3	23.4	58.8	.....	.....	.....	.....	.....	.....	.....	.....
1940	40.5	27.4	67.7	25.8	63.7	.....	.....	.....	.....	.....	.....	.....	.....
1941	45.1	32.7	72.5	30.8	68.3	.....	.....	.....	.....	.....	.....	.....	.....
1942	50.9	35.6	69.9	33.4	65.6	.....	.....	.....	.....	.....	.....	.....	.....
1943	53.3	37.7	70.7	35.5	66.6	.....	.....	.....	.....	.....	.....	.....	.....
1944	53.6	40.6	75.7	38.5	71.8	.....	.....	.....	.....	.....	.....	.....	.....
1945	54.6	41.2	75.5	38.9	71.2	.....	.....	.....	.....	.....	.....	.....	.....
1946	62.3	47.2	75.8	44.7	71.7	.....	.....	.....	.....	.....	.....	.....	.....
1947	76.5	73.4	95.9	71.5	93.5	72.5	94.8	68.3	89.3	114.6	149.8	99.0	129.4
1948	82.8	84.0	101.4	81.2	98.1	82.8	100.0	76.6	92.5	147.6	178.3	103.3	124.8
1949	78.7	77.7	98.7	74.3	94.4	75.8	96.3	69.6	88.4	128.0	162.6	90.8	115.4
1950	81.8	89.3	109.2	86.6	105.9	88.1	107.7	82.1	100.4	148.0	180.9	99.0	121.0
1951	91.1	97.2	106.7	93.7	102.9	95.6	104.9	88.2	96.8	157.5	172.9	108.3	118.9
1952	88.6	94.4	106.5	91.3	103.0	95.2	107.4	81.2	91.6	143.5	162.0	98.9	111.6
1953	87.4	94.3	107.9	90.5	103.5	93.2	106.6	82.8	94.7	144.0	164.8	105.8	121.1
1954	87.6	92.6	105.7	88.9	101.5	91.8	104.8	81.0	92.5	139.3	159.0	98.0	111.9
1955	87.8	97.1	110.6	94.5	107.6	97.7	111.3	85.7	97.6	143.4	163.3	100.2	114.1
1956	90.7	98.5	108.6	96.5	106.4	98.5	108.6	91.1	100.4	131.2	144.7	102.3	112.8
1957	93.3	93.5	100.2	90.9	97.4	92.6	99.2	86.3	92.5	118.6	127.1	101.3	108.6
1958	94.6	92.4	97.7	89.5	94.6	90.8	96.0	86.3	91.2	119.5	126.3	102.0	107.8
1959	94.8	98.8	104.2	96.4	101.7	98.7	104.1	89.9	94.8	127.3	134.3	103.8	109.5
1960	94.9	95.3	100.4	92.1	97.0	92.7	97.7	90.8	95.7	113.2	119.3	105.2	110.9
1961	94.5	91.0	96.3	87.4	92.5	87.9	93.0	86.2	91.2	110.0	116.4	103.8	109.8
1962	94.8	91.6	96.6	89.0	93.9	90.1	95.0	86.0	90.7	106.3	112.1	100.1	105.6
1963	94.5	93.5	98.9	91.2	96.5	92.1	97.5	88.8	94.0	108.9	115.2	99.6	105.4
1964	94.7	95.4	100.7	92.9	98.1	93.3	98.5	92.2	97.4	105.6	111.5	100.8	106.4
1965	96.6	95.9	99.3	94.0	97.3	93.1	96.4	97.4	100.8	105.7	109.4	100.5	104.0
1966	99.8	100.2	100.4	100.1	100.3	97.7	97.9	108.7	108.9	106.1	106.3	101.3	101.5
1967	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1968	102.5	113.3	110.5	117.4	114.5	120.7	117.8	104.5	102.0	129.2	126.0	100.5	98.0
1969	106.5	125.3	117.7	131.6	123.6	134.5	126.3	120.1	112.8	139.2	130.7	104.0	97.7
1970	110.4	113.6	102.9	113.7	103.0	113.3	102.6	114.6	103.8	113.6	102.9	102.5	92.8
1971	114.0	127.3	111.7	136.0	119.3	141.6	124.2	113.4	99.5	127.0	111.4	100.7	88.3
1972	119.1	144.3	121.2	159.4	133.8	167.7	140.8	126.2	106.0	154.9	130.1	104.3	87.6
1973	134.7	177.2	131.6	205.2	152.3	214.3	159.1	169.0	125.5	194.0	144.0	112.7	83.7
1974	160.1	183.6	114.7	207.1	129.4	211.4	132.0	189.5	118.4	186.8	116.7	130.2	81.3
1975	174.9	176.9	101.1	192.5	110.1	200.6	114.7	160.3	91.7	200.6	114.7	119.5	68.3
1976	183.0	205.6	112.3	233.0	127.3	248.1	135.6	176.0	96.2	247.6	135.3	122.5	66.9
1977	194.2	236.3	121.7	276.5	142.4	297.4	153.1	200.3	103.1	295.8	152.3	127.7	65.8
1978	209.3	276.0	131.9	322.4	154.0	346.0	165.3	235.8	112.7	326.4	155.9	140.2	67.0
1979	235.6	300.4	127.5	354.3	150.4	380.0	161.3	260.0	110.4	322.3	136.8	169.1	71.8

See footnotes at end of table.

Table 1.4—*Producer price indexes of selected timber products and competing materials in the United States, 1926–79—Cont'd.*

(1967=100)

Year	Woodpulp		Paper		Container board		Insulation board		Hardboard, type II		Particleboard		Millwork	
	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]
1926	38.3	74.2	45.0	87.2	.....	.....	.....	.....	.....	.....	.....	.....	30.0	58.1
1927	35.4	71.8	41.1	83.4	.....	.....	.....	.....	.....	.....	.....	.....	30.0	60.9
1928	34.0	68.0	40.7	81.4	.....	.....	.....	.....	.....	.....	.....	.....	29.9	59.8
1929	33.9	69.0	40.0	81.5	.....	.....	.....	.....	.....	.....	.....	.....	30.1	61.3
1930	33.1	74.2	39.9	89.5	.....	.....	.....	.....	.....	.....	.....	.....	28.4	63.7
1931	30.7	81.6	38.6	102.7	.....	.....	.....	.....	.....	.....	.....	.....	23.8	63.3
1932	24.6	73.2	36.2	107.7	.....	.....	.....	.....	.....	.....	.....	.....	23.4	69.6
1933	25.0	73.5	34.5	101.5	.....	.....	.....	.....	.....	.....	.....	.....	24.6	72.4
1934	30.0	77.7	36.0	93.3	.....	.....	.....	.....	.....	.....	.....	.....	25.6	66.3
1935	27.7	67.1	36.2	87.7	.....	.....	.....	.....	.....	.....	.....	.....	25.3	61.3
1936	28.8	69.1	36.4	87.3	.....	.....	.....	.....	.....	.....	.....	.....	27.2	65.2
1937	44.6	100.2	38.6	86.7	.....	.....	.....	.....	.....	.....	.....	.....	32.6	73.3
1938	32.8	81.0	39.4	97.3	.....	.....	.....	.....	.....	.....	.....	.....	29.3	72.3
1939	28.2	70.9	38.5	96.7	.....	.....	.....	.....	.....	.....	.....	.....	28.8	72.4
1940	43.0	106.2	40.3	99.5	.....	.....	.....	.....	.....	.....	.....	.....	31.4	77.5
1941	47.4	105.1	42.3	93.8	.....	.....	.....	.....	.....	.....	.....	.....	35.8	79.4
1942	49.3	96.9	43.4	85.3	.....	.....	.....	.....	.....	.....	.....	.....	39.2	77.0
1943	49.3	92.5	44.5	83.5	.....	.....	.....	.....	.....	.....	.....	.....	39.5	74.1
1944	53.3	99.4	45.5	84.9	.....	.....	.....	.....	.....	.....	.....	.....	40.7	75.9
1945	53.8	98.5	45.9	84.1	.....	.....	.....	.....	.....	.....	.....	.....	41.0	75.1
1946	59.5	95.5	50.2	80.6	.....	.....	.....	.....	.....	.....	.....	.....	46.3	74.3
1947	81.0	105.9	59.5	77.8	84.8	110.8	71.6	94.0	.....	.....	.....	.....	59.4	77.6
1948	90.9	109.8	65.5	79.1	85.4	103.1	79.2	95.6	.....	.....	.....	.....	71.7	86.6
1949	82.2	104.4	66.3	84.2	85.7	108.9	80.3	102.0	.....	.....	.....	.....	73.4	93.3
1950	81.0	99.0	67.9	83.0	87.6	107.1	82.8	101.2	.....	.....	.....	.....	78.2	95.6
1951	96.9	106.4	76.0	83.4	100.5	110.3	87.3	95.8	.....	.....	.....	.....	88.7	97.4
1952	94.5	106.7	79.1	89.3	98.6	111.3	88.9	100.3	.....	.....	.....	.....	86.5	97.6
1953	92.4	105.7	80.1	91.6	99.9	114.3	93.4	106.9	.....	.....	.....	.....	89.6	102.5
1954	93.0	106.2	80.8	92.2	102.2	116.7	98.3	112.2	.....	.....	.....	.....	88.9	101.5
1955	95.7	109.0	82.8	94.3	102.2	116.4	100.7	114.7	.....	.....	.....	.....	87.7	99.9
1956	99.8	110.0	87.6	96.6	105.4	116.2	105.4	116.2	.....	.....	.....	.....	88.0	97.0
1957	100.7	107.9	90.5	97.0	106.6	114.3	108.9	116.7	.....	....	.....	.....	87.4	93.7
1958	102.8	108.7	90.7	95.9	106.6	112.7	111.3	117.7	101.3	107.1	.....	.....	87.3	92.3
1959	102.8	108.4	91.5	96.5	106.6	112.4	114.3	120.6	102.2	107.8	.....	.....	92.6	97.7
1960	102.2	107.7	92.7	97.7	106.2	111.9	113.9	120.0	101.5	107.0	.....	.....	93.1	98.1
1961	96.9	102.5	92.9	98.3	97.2	102.9	112.6	119.2	102.0	107.9	.....	.....	90.8	96.1
1962	95.1	100.3	93.3	98.4	98.5	103.9	105.4	111.2	102.9	108.5	.....	.....	90.7	95.7
1963	93.6	99.0	93.1	98.5	100.9	106.8	102.7	108.7	103.8	109.8	.....	.....	92.7	98.1
1964	98.1	103.6	94.2	99.5	103.9	109.7	100.4	106.0	102.2	107.9	.....	.....	96.7	102.1
1965	100.1	103.6	94.6	97.9	103.9	107.6	98.2	101.7	102.1	105.7	.....	.....	96.0	99.4
1966	100.0	100.2	97.5	97.7	103.9	104.1	98.4	98.6	101.9	102.1	108.3	108.5	98.0	98.2
1967	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1968	100.0	97.6	102.0	99.5	93.1	90.8	103.0	100.5	98.3	95.9	101.5	99.0	105.8	103.2
1969	100.0	93.9	105.5	99.1	97.2	91.3	108.8	102.2	99.8	93.7	120.4	113.1	117.8	110.6
1970	109.6	99.3	111.0	100.5	99.0	89.7	110.5	100.1	102.2	92.6	85.7	77.6	116.0	105.1
1971	112.1	98.3	114.2	100.2	100.3	88.0	114.5	100.4	101.1	88.7	84.3	73.9	120.8	106.0
1972	111.5	93.6	116.3	97.6	103.9	87.2	119.0	99.9	102.2	85.8	85.3	71.6	128.4	107.8
1973	128.3	95.2	121.4	90.1	113.4	84.2	121.7	90.3	105.2	78.1	95.1	70.6	144.2	107.1
1974	217.8	136.0	148.6	92.8	146.2	91.3	133.9	83.6	118.0	73.7	97.1	60.6	157.1	98.1
1975	283.4	162.0	172.9	98.9	171.5	98.1	144.0	82.3	117.7	67.3	90.0	51.5	160.4	91.7
1976	286.0	156.3	182.3	99.6	176.1	96.2	161.0	88.0	131.4	71.8	97.4	53.2	176.9	96.7
1977	281.1	144.7	194.3	100.1	172.0	88.6	177.9	91.6	142.7	73.5	113.5	58.4	193.7	99.7
1978	266.5	127.3	206.1	98.5	172.7	82.5	202.5	96.8	157.0	75.0	151.2	72.2	235.4	112.5
1979	314.3	133.4	229.6	97.5	197.8	84.0	198.8	84.4	164.7	69.9	139.6	59.3	254.3	107.9

See footnotes at end of table.

Table 1.4—*Producer price indexes of selected timber products and competing materials in the United States, 1926–79—Cont'd.*

(1967=100)

Year	Metals and metal products		Steel structural shapes		Metal doors, sash, and trim		Aluminum siding, noninsulated		Flat glass		Concrete products	
	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]
1926	41.4	80.2	.....	.....	.....	.....	.....	.....	.....	.....	70.5	136.6
1927	38.8	78.7	.....	.....	.....	.....	.....	.....	.....	.....	70.5	143.0
1928	38.8	77.6	.....	.....	.....	.....	.....	.....	.....	.....	70.5	141.0
1929	40.2	81.9	.....	.....	.....	.....	.....	.....	.....	.....	69.4	141.3
1930	36.2	81.2	.....	.....	.....	.....	.....	.....	.....	.....	70.4	157.8
1931	32.6	86.7	.....	.....	.....	.....	.....	.....	.....	.....	66.3	176.3
1932	29.9	89.0	.....	.....	.....	.....	.....	.....	.....	.....	61.2	182.1
1933	30.7	90.3	.....	.....	.....	.....	.....	.....	.....	.....	62.1	182.6
1934	33.9	87.8	.....	.....	.....	.....	.....	.....	.....	.....	62.1	160.9
1935	33.8	81.8	.....	.....	.....	.....	.....	.....	.....	.....	56.7	137.3
1936	34.5	82.7	.....	.....	.....	.....	.....	.....	.....	.....	60.3	144.6
1937	39.4	88.5	.....	.....	.....	.....	.....	.....	.....	.....	60.6	136.2
1938	38.0	93.8	.....	.....	.....	.....	.....	.....	.....	.....	55.6	137.3
1939	37.6	94.5	.....	.....	.....	.....	.....	.....	.....	.....	55.4	139.2
1940	37.8	93.3	.....	.....	.....	.....	.....	.....	.....	.....	49.3	121.7
1941	38.5	85.4	.....	.....	.....	.....	.....	.....	.....	.....	57.3	127.1
1942	39.1	76.8	.....	.....	.....	.....	.....	.....	.....	.....	59.2	116.3
1943	39.0	73.2	.....	.....	.....	.....	.....	.....	.....	.....	59.2	111.1
1944	39.0	72.8	.....	.....	.....	.....	.....	.....	.....	.....	59.2	110.4
1945	39.6	72.5	.....	.....	.....	.....	.....	.....	.....	.....	59.2	108.4
1946	44.3	71.1	.....	.....	.....	.....	.....	.....	.....	.....	62.7	100.6
1947	54.9	71.8	39.5	51.6	71.9	94.0	.....	.....	.....	.....	71.3	93.2
1948	62.5	75.5	48.1	58.1	75.1	90.7	.....	.....	.....	.....	74.7	90.2
1949	63.0	80.1	52.8	67.1	76.7	97.5	.....	.....	.....	.....	76.4	97.1
1950	66.3	81.1	56.6	69.2	82.0	100.2	.....	.....	.....	.....	78.2	95.6
1951	73.8	81.0	60.0	65.9	90.1	98.9	.....	.....	.....	.....	83.3	91.4
1952	73.9	83.4	61.3	69.2	87.8	99.1	.....	.....	.....	.....	83.4	94.1
1953	76.3	87.3	64.7	74.0	91.4	104.6	.....	.....	.....	.....	85.5	97.8
1954	76.9	87.8	67.3	76.8	96.5	110.2	.....	.....	.....	.....	87.1	99.4
1955	82.1	93.5	71.0	80.9	103.9	118.3	.....	.....	.....	.....	88.0	100.2
1956	89.2	98.3	76.2	84.0	108.5	119.6	.....	.....	.....	.....	91.1	100.4
1957	91.0	97.5	87.7	94.0	104.8	112.3	.....	.....	.....	.....	93.6	100.3
1958	90.4	95.6	91.4	96.6	105.7	111.7	.....	.....	.....	.....	94.9	100.3
1959	92.3	97.4	93.4	98.5	100.7	106.2	.....	.....	.....	.....	96.1	101.4
1960	92.4	97.4	93.4	98.4	98.9	104.2	.....	.....	.....	.....	97.2	102.4
1961	91.9	97.2	93.4	98.8	98.4	104.1	108.7	115.0	.....	.....	97.2	102.9
1962	91.2	96.2	93.4	98.5	97.9	103.3	102.2	107.8	.....	.....	97.3	102.6
1963	91.3	96.6	94.1	99.6	95.5	101.1	98.9	104.7	.....	.....	96.5	102.1
1964	93.8	99.0	96.2	101.6	96.0	101.4	100.1	105.7	.....	.....	95.7	101.1
1965	96.4	99.8	96.2	99.6	95.4	98.8	98.2	101.7	.....	.....	96.3	99.7
1966	98.8	99.0	99.9	100.1	97.7	97.9	102.4	102.6	.....	.....	97.7	97.9
1967	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1968	102.6	101.1	101.8	99.3	103.9	101.4	100.3	97.9	104.4	101.9	102.6	100.1
1969	108.5	101.9	108.1	101.5	108.5	101.9	101.0	94.8	109.6	102.9	106.5	100.0
1970	116.6	105.6	115.3	104.4	113.0	102.4	104.6	94.7	115.6	104.7	112.2	101.6
1971	118.7	104.1	127.0	111.4	117.6	103.2	105.2	92.3	123.2	108.1	120.6	105.8
1972	123.5	103.7	134.6	113.0	120.5	101.2	105.8	88.8	122.4	102.8	125.6	105.5
1973	132.8	98.6	140.7	104.5	124.5	92.4	109.4	81.2	121.4	90.1	131.7	97.8
1974	171.9	107.4	179.0	111.8	147.3	92.0	139.8	87.3	128.8	80.4	151.7	94.8
1975	185.6	106.1	216.3	123.7	162.5	92.9	150.1	85.8	139.2	79.6	170.5	97.5
1976	195.9	107.0	227.1	124.1	171.3	93.6	162.0	88.5	150.0	82.0	180.1	98.4
1977	209.0	107.6	241.2	124.2	188.7	97.2	184.9	95.2	160.8	82.8	191.8	98.8
1978	227.1	108.5	272.0	130.0	207.6	99.2	211.8	101.2	172.8	82.6	214.0	102.2
1979	259.3	110.1	300.4	127.5	229.6	97.5	223.2	94.7	183.9	78.1	244.1	103.6

See footnotes at end of table.

Table 1.4—*Producer price indexes of selected timber products and competing materials in the United States, 1926–79—Cont'd.*

(1967=100)

Year	Ready-mixed concrete		Building brick		Clay tile		Prepared asphalt roofing		Gypsum products		Soft surface floor coverings		Hard surface floor coverings	
	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]
1926	.....	.....	.....	.....	.....	.....	83.5	161.8	.....	.....	.....	.....	.....	.....
1927	.....	.....	.....	.....	.....	.....	78.8	159.8	.....	.....	.....	.....	.....	.....
1928	.....	.....	.....	.....	.....	.....	70.6	141.2	.....	.....	.....	.....	.....	.....
1929	.....	.....	.....	.....	.....	.....	62.2	126.7	.....	.....	.....	.....	.....	.....
1930	.....	.....	.....	.....	.....	.....	63.7	142.8	.....	.....	.....	.....	.....	.....
1931	.....	.....	.....	.....	.....	.....	66.0	175.5	.....	.....	.....	.....	.....	.....
1932	.....	.....	.....	.....	.....	.....	60.4	179.8	.....	.....	.....	.....	.....	.....
1933	.....	.....	.....	.....	.....	.....	61.9	182.1	.....	.....	.....	.....	.....	.....
1934	.....	.....	.....	.....	.....	.....	66.7	172.8	.....	.....	.....	.....	.....	.....
1935	.....	.....	.....	.....	.....	.....	69.9	169.2	.....	.....	.....	.....	.....	.....
1936	.....	.....	.....	.....	.....	.....	68.9	165.2	.....	.....	.....	.....	.....	.....
1937	.....	.....	.....	.....	.....	.....	75.3	169.2	.....	.....	.....	.....	.....	.....
1938	.....	.....	.....	.....	.....	.....	60.9	150.4	.....	.....	.....	.....	.....	.....
1939	.....	.....	.....	.....	.....	.....	63.0	158.3	.....	.....	.....	.....	.....	.....
1940	.....	.....	.....	.....	.....	.....	68.7	169.6	.....	.....	.....	.....	.....	.....
1941	.....	.....	.....	.....	.....	.....	70.9	157.2	.....	.....	.....	.....	.....	.....
1942	.....	.....	.....	.....	.....	.....	69.1	135.8	.....	.....	.....	.....	.....	.....
1943	.....	.....	.....	.....	.....	.....	69.0	129.5	.....	.....	.....	.....	.....	.....
1944	.....	.....	.....	.....	.....	.....	69.7	130.0	.....	.....	.....	.....	.....	.....
1945	.....	.....	.....	.....	.....	.....	71.0	130.0	.....	.....	.....	.....	.....	.....
1946	.....	.....	.....	.....	.....	.....	74.3	119.3	.....	.....	.....	.....	.....	.....
1947	.....	.....	58.9	77.0	69.2	90.5	84.7	110.7	70.3	91.9	78.2	102.2	81.3	106.3
1948	.....	.....	66.1	79.8	72.2	87.2	92.8	112.1	76.8	92.8	85.5	103.3	82.5	99.6
1949	.....	.....	69.0	87.7	74.1	94.2	92.6	117.7	76.1	96.7	87.7	111.4	79.9	101.5
1950	.....	.....	71.5	87.4	76.6	93.6	91.2	111.5	77.8	95.1	104.7	128.0	78.1	95.5
1951	.....	.....	76.2	83.6	82.5	90.6	94.4	103.6	87.4	95.9	131.2	144.0	83.4	91.5
1952	.....	.....	75.9	85.7	82.6	93.2	92.6	104.5	87.5	98.8	109.9	124.0	86.9	98.1
1953	.....	.....	77.1	88.2	83.8	95.9	96.6	110.5	90.1	103.1	111.1	127.1	89.4	102.3
1954	.....	.....	78.1	89.2	85.6	97.7	93.7	107.0	90.9	103.8	107.7	122.9	91.8	104.8
1955	.....	.....	81.0	92.3	88.2	100.5	95.5	108.8	90.9	103.5	110.6	126.0	93.9	106.9
1956	.....	.....	85.9	94.7	91.4	100.8	100.5	110.8	94.6	104.3	113.6	125.2	98.9	109.0
1957	.....	.....	87.0	93.2	91.6	98.2	110.1	118.0	94.6	101.4	116.3	124.7	99.6	106.8
1958	94.7	100.1	87.7	92.7	92.4	97.7	101.6	107.4	98.2	103.8	109.2	115.4	98.3	103.9
1959	95.8	101.1	89.9	94.8	93.9	99.1	104.9	110.7	99.0	104.4	109.7	115.7	98.2	103.6
1960	96.6	101.8	91.3	96.2	95.7	100.8	96.6	101.8	99.1	104.4	111.7	117.7	99.9	105.3
1961	96.8	102.4	91.5	96.8	96.4	102.0	104.0	110.1	101.0	106.9	108.7	115.0	101.2	107.1
1962	97.1	102.4	92.5	97.6	96.9	102.2	100.0	105.5	102.1	107.7	106.8	112.7	97.8	103.2
1963	96.9	102.5	93.6	99.0	96.9	102.5	94.9	100.4	102.5	108.5	105.4	111.5	99.0	104.8
1964	96.1	101.5	94.4	99.7	96.4	101.8	93.7	98.9	105.3	111.2	109.2	115.3	100.9	106.5
1965	96.5	99.9	95.6	99.0	96.7	100.1	98.0	101.4	101.2	104.8	105.5	109.2	101.7	105.3
1966	98.0	98.2	98.3	98.5	97.9	98.1	102.6	102.8	99.6	99.8	104.9	105.1	100.9	101.1
1967	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1968	102.6	100.1	103.4	100.9	102.9	100.4	104.0	101.5	103.6	101.1	100.7	98.2	102.8	100.3
1969	107.2	100.7	107.8	101.2	106.2	99.7	103.4	97.1	103.6	97.3	100.7	94.6	100.0	93.9
1970	113.6	102.9	112.2	101.6	109.1	98.8	101.6	92.0	99.7	90.3	99.0	89.7	100.4	90.9
1971	122.6	107.5	116.9	102.5	114.1	100.1	126.5	111.0	109.3	95.9	96.7	84.8	104.0	91.2
1972	127.9	107.4	122.1	102.5	114.5	96.1	133.4	112.0	114.7	96.3	96.1	80.7	104.5	87.7
1973	133.3	99.0	130.8	97.1	119.1	88.4	138.3	102.7	120.9	89.8	101.0	75.0	105.2	78.1
1974	153.3	95.8	143.5	89.6	130.1	81.3	189.9	118.6	137.6	85.9	110.9	69.3	125.8	78.6
1975	171.8	98.2	160.5	91.8	145.4	83.1	217.9	124.6	144.0	82.3	114.6	65.5	148.5	84.9
1976	184.1	100.6	177.0	96.7	156.1	85.3	231.3	126.4	154.4	84.4	117.9	64.4	163.2	89.2
1977	196.6	101.2	204.0	105.5	158.8	81.8	246.4	126.9	183.5	94.5	121.9	62.8	172.0	88.6
1978	218.9	104.6	234.4	112.0	158.1	75.5	288.8	138.0	229.1	109.5	126.2	60.3	180.7	86.3
1979	249.6	105.9	263.1	111.7	171.3	72.7	315.2	133.8	252.3	107.1	130.0	55.2	199.2	84.6

[1]Derived by dividing the actual price index by the all commodities price index.

Source: U.S. Department of Labor, Bureau of Labor Statistics. *Producer prices and price indexes.* Annual Supp.

Table 1.5—*Board used per new housing unit in the United States, by type of board and unit, 1970 and 1976, with projections (base level price trends) to 2030*

(Square feet)

Type of board and unit	1970	1976	Projections 1990	2000	2010	2020	2030
HARDBOARD (⅛-inch basis)							
One-family	1,040	1,120	1,445	1,640	1,720	1,790	1,800
Multifamily	60	560	640	680	715	725	760
Mobile homes	170	435	915	1,180	1,395	1,545	1,595
INSULATING BOARD (½-inch basis)							
One-family	960	910	820	790	740	700	690
Multifamily	50	375	290	275	260	255	250
Mobile homes	710	835	770	705	665	645	630
PARTICLEBOARD[1] (¾-inch basis)							
One-family	255	340	850	1,130	1,275	1,395	1,460
Multifamily	75	95	265	330	375	405	420
Mobile homes	560	860	825	785	755	725	700

[1]Includes waferboard, flakeboard, composite board, and medium-density fiberboard.

Table 1.6—*Per capita expenditures for new nonresidential construction in the United States, by construction class, specified years 1920–78, with projections to 2030*

Year	All classes		Buildings: Commercial[3]		Buildings: Other[4]		Utilities[1]		Highways		All other[2]	
	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change	Expenditures	Annual rate of change
	1972 dollars	*Percent*	*1972 dollars*	*Percent*	*1972 dollars*	*Percent*	*1972 dollars*	*Percent*	*1972 dollars*	*Percent*	*1972 dollars*	*Percent*
1920	145	.....	23	.....	69	.....	29	.....	12	....	11	....
1925	212	7.9	37	10.0	85	4.3	56	14.7	23	13.9	11	0
1930	228	1.5	32	−2.9	79	−1.5	63	2.4	38	10.6	15	6.4
1935	104	−14.5	9	−22.4	27	−19.3	20	−20.5	21	−11.2	27	12.5
1940	158	8.7	13	7.6	46	11.2	34	11.2	34	10.1	31	2.8
1945	104	−8.0	5	−17.4	50	1.7	21	−9.2	7	−27.1	21	−7.5
1950	203	14.3	20	32.0	83	10.7	51	19.4	30	33.8	20	−1.0
1955	261	5.2	36	12.5	108	5.4	52	.4	44	8.0	27	6.2
1960	292	2.3	39	1.6	116	.4	50	−.8	53	3.8	34	4.7
1965	365	4.6	...	.....	...	....	61	4.1	61	2.9	35	.6
1970	355	−.6	55	.....	136	....	76	4.5	56	−1.7	32	−1.8
1971	346	−2.5	60	9.1	125	−8.1	75	−1.3	56	0	31	−3.1
1972	339	−2.0	64	6.7	118	−5.6	77	2.7	50	−10.7	31	0
1973	353	4.1	68	6.3	125	5.9	81	5.2	47	−6.0	31	0
1974	325	−7.9	59	−13.2	117	−6.4	78	−3.7	41	−12.8	31	0
1975	292	−10.2	44	−25.4	107	−8.6	77	−1.3	34	−17.1	30	−3.2
1976	281	−3.8	43	−2.3	99	−7.5	79	2.6	31	−8.8	29	−3.3
1977	279	−.1	46	7.0	97	−2.0	78	−1.3	28	−9.7	30	3.4
1978	302	8.2	51	10.9	105	8.2	88	12.8	26	−7.1	31	3.3
Low projections[5]												
1990	405	[6]1.1	76	[6]1.8	140	[6].8	106	[6]1.9	48	[6]−.1	35	[6].6
2000	441	.9	86	1.2	149	.6	121	1.3	48	0	37	.6
2010	484	.9	97	1.2	161	.8	137	1.2	49	.2	39	.5
2020	521	.7	107	1.0	171	.6	151	1.0	50	.2	41	.5
2030	578	1.0	121	1.2	188	1.0	171	1.3	52	.4	45	.9
Medium projections[5]												
1990	408	[6]1.2	78	[6]2.0	140	[6].8	108	[6]2.1	47	[6]−.3	35	[6].6
2000	443	.8	88	1.2	149	.6	124	1.4	46	−.2	36	.3
2010	481	.8	99	1.2	158	.6	140	1.2	46	0	38	.5
2020	510	.6	107	.8	165	.4	152	.8	46	0	40	.5
2030	552	.8	119	1.1	176	.6	169	1.1	46	0	42	.5
High projections[5]												
1990	404	[6]1.1	78	[6]2.0	138	[6].7	109	[6]2.1	46	[6]−.5	34	[6].4
2000	435	.7	88	1.2	144	.4	124	1.3	44	−.4	35	.3
2010	460	.6	97	1.0	150	.4	137	1.0	42	−.5	36	.3
2020	469	.2	101	.4	150	0	143	.4	39	−.7	36	0
2030	486	.4	107	.6	153	.2	152	.6	38	−.3	36	0

[1]Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.
[2]Includes military facilities, conservation and development, railroad construction except track construction, and all other public and private construction not included in the other categories.
[3]Includes private commercial buildings such as offices, stores, warehouses, and restaurants.
[4]Includes public and private nonhousekeeping, industrial, educational, religious, hospital and institutional, farm service, and miscellaneous buildings.
[5]Projections based on alternate assumptions about growth in population and economic growth as specified in Chapter 2.
[6]Rates of change calculated from the following 1976 trend level values: all classes, $347; commercial building, $59; other buildings, $26; utilities, $80; highways, $49; and all other, $32.

Note: Data may not add to totals because of rounding.

Sources: Calculated from information shown in text tables 2.1 and 3.11.

Table 1.7—*Lumber used in new nonresidential construction in the United States, by construction class, 1962, 1970, 1973, and 1976, with projections (base level price trends) to 2030*

Year	All classes		Buildings: Commercial[3]		Buildings: Other[4]		Utilities[1]		Highways		All other[2]	
	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]
	Million board feet	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*
1962	3,303.4	57.2	411.0	47.3	1,772.4	76.9	480.0	52.8	350.0	33.0	290.0	46.0
1970	3,528.4	48.5	450.0	40.0	1,779.9	64.1	660.0	42.3	322.0	28.0	316.5	48.0
1973	3,695.3	49.8	732.0	51.1	1,698.0	64.3	667.4	39.0	266.9	27.0	331.0	51.0
1976	3,000.6	49.7	480.0	52.1	1,439.8	68.0	594.0	35.0	153.8	23.0	333.0	53.0
Low projections[6]												
1990	4,090	42.7	950	53.0	1,790	54.0	630	25.0	220	19.0	500	61.0
2000	4,420	40.7	1,190	56.0	1,840	50.0	610	20.5	200	16.8	590	65.0
2010	4,750	39.2	1,400	57.2	1,900	47.0	580	17.0	180	15.0	690	70.0
2020	5,060	38.4	1,570	58.1	2,000	46.0	550	14.5	170	13.8	770	73.0
2030	5,420	37.6	1,770	58.5	2,110	45.0	530	12.5	170	13.0	840	75.0
Medium projections[6]												
1990	4,240	42.7	1,000	53.0	1,840	54.0	660	25.0	220	19.0	520	61.0
2000	4,700	40.7	1,280	56.0	1,940	50.0	660	20.5	200	16.8	620	65.0
2010	5,190	39.2	1,560	57.2	2,050	47.0	650	17.0	190	15.0	740	70.0
2020	5,670	38.4	1,810	58.1	2,200	46.0	640	14.5	180	13.8	840	73.0
2030	6,230	37.6	2,090	58.5	2,380	45.0	630	12.5	180	13.0	940	75.0
High projections[6]												
1990	4,390	42.7	1,050	53.0	1,900	54.0	690	25.0	220	19.0	530	61.0
2000	5,010	40.7	1,390	56.0	2,040	50.0	720	20.5	210	16.8	650	65.0
2010	5,680	39.2	1,740	57.2	2,220	47.0	730	17.0	200	15.0	790	70.0
2020	6,370	38.4	2,080	58.1	2,440	46.0	740	14.5	190	13.8	920	73.0
2030	7,170	37.6	2,460	58.5	2,710	45.0	750	12.5	190	13.0	1,060	75.0

[1]Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.
[2]Includes military facilities, conservation and development, railroad construction except track construction, and all other public and private construction not included in the other categories.
[3]Includes private commercial buildings such as offices, stores, warehouses, and restaurants.
[4]Includes public and private nonhousekeeping, industrial, educational, religious, hospital and institutional, farm service, and miscellaneous buildings.
[5]1972 dollars.
[6]Projections based on alternate assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: Estimates based on Forest Service surveys except highways, which were adapted from data provided by U.S. Department of Transportation, Bureau of Public Roads.

Projections: U.S. Department of Agriculture, Forest Service.

Table 1.8—*Plywood used in new nonresidential construction in the United States, by construction class, 1962, 1970, 1973, and 1976, with projections (base level price trends) to 2030*

(⅜-inch basis)

Year	All classes		Buildings				Utilities[1]		Highways		All other[2]	
			Commercial[3]		Other[4]							
	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]	Total	Use per 1000 dollars of expenditure[5]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1962	1,639.4	28.4	364.8	42.3	784.6	34.1	130.0	14.3	280.0	26.1	80.0	12.8
1970	1,889.3	26.0	258.6	23.0	917.7	33.1	180.0	11.5	443.0	38.5	90.0	13.7
1973	2,158.5	29.1	412.5	28.8	914.2	34.6	195.1	11.4	546.5	55.3	90.2	13.9
1976	1,824.5	30.3	303.9	33.0	783.4	37.0	178.1	10.5	470.0	70.3	89.1	14.2
					Low projections[6]							
1990	3,080	32.1	630	35.0	1,420	43.0	210	8.2	690	61.0	130	15.5
2000	3,610	33.3	780	35.0	1,690	46.0	210	7.2	780	66.0	150	16.3
2010	4,160	34.3	940	38.5	1,980	49.0	220	6.5	850	69.0	170	17.0
2020	4,570	34.6	1,060	39.0	2,220	51.0	230	6.1	880	70.0	180	17.3
2030	4,970	34.5	1,190	39.5	2,410	51.5	250	5.8	920	70.5	200	17.5
					Medium projections[6]							
1990	3,180	32.0	660	35.0	1,470	43.0	220	8.2	700	61.0	130	15.5
2000	3,810	33.0	850	37.0	1,780	46.0	230	7.2	790	66.0	160	16.3
2010	4,490	33.9	1,050	38.5	2,140	49.0	250	6.5	870	69.0	180	17.0
2020	5,050	34.2	1,210	39.0	2,440	51.0	270	6.1	930	70.0	200	17.3
2030	5,630	34.0	1,410	39.5	2,730	51.5	300	5.8	970	70.5	220	17.5
					High projections[6]							
1990	3,280	31.8	690	35.0	1,510	43.0	230	8.2	710	61.0	140	15.5
2000	4,020	32.7	920	37.0	1,880	46.0	250	7.2	810	66.0	160	16.3
2010	4,850	33.5	1,170	38.5	2,310	49.0	280	6.5	900	69.0	190	17.0
2020	5,610	33.8	1,400	39.0	2,710	51.0	310	6.1	970	70.0	220	17.3
2030	6,390	33.5	1,660	39.5	3,090	51.5	350	5.8	1,040	70.5	250	17.5

[1]Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.
[2]Includes military facilities, conservation and development, railroad construction except track construction, and all other public and private construction not included in the other categories.
[3]Includes private commercial buildings such as offices, stores, warehouses, and restaurants.
[4]Includes public and private nonhousekeeping, industrial, educational, religious, hospital and institutional, farm service, and miscellaneous buildings.
[5]1972 dollars.
[6]Projections based on alternate assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: Estimates based on Forest Service surveys except highways, which were adapted from data provided by U.S. Department of Transportation, Bureau of Public Roads.

Projections: U.S. Department of Agriculture, Forest Service.

Table 1.9—*Board*[1] *used in new nonresidential construction in the United States, by construction class, 1962, 1970, 1973, and 1976, with projections (base level price trends) to 2030*

(*½-inch basis*)

Year	All classes		Buildings				Utilities[2]		Highways		All other[3]	
			Commercial[4]		Other[5]							
	Total	Use per 1000 dollars of expenditure[6]	Total	Use per 1000 dollars of expenditure[6]	Total	Use per 1000 dollars of expenditure[6]	Total	Use per 1000 dollars of expenditure[6]	Total	Use per 1000 dollars of expenditure[6]	Total	Use per 1000 dollars of expenditure[6]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1962	605.0	10.5	90.0	10.3	430.0	18.7	50.0	5.5	10.0	1.0	25.0	4.0
1970	785.0	10.8	150.0	13.3	570.0	20.5	20.0	1.3	15.0	1.3	30.0	4.6
1973	915.3	12.3	214.7	15.0	620.7	23.5	25.7	1.5	19.8	2.0	34.4	5.3
1976	821.5	13.6	165.8	18.0	567.5	26.8	33.9	2.0	16.7	2.5	37.6	6.0
Low projections[7]												
1990	1,610	16.8	430	24.0	1,010	30.5	60	2.4	40	3.7	70	8.4
2000	2,060	19.0	600	28.2	1,230	33.5	80	2.8	60	4.7	90	10.2
2010	2,510	20.6	770	31.5	1,450	36.0	100	3.0	70	5.5	120	12.0
2020	2,850	21.6	920	33.8	1,600	37.0	110	3.1	80	6.3	140	13.4
2030	3,160	21.9	1,040	34.5	1,730	37.0	140	3.2	90	6.5	160	14.7
Medium projections[7]												
1990	1,670	16.8	450	24.0	1,050	30.5	60	2.4	40	3.7	70	8.4
2000	2,190	19.0	640	28.2	1,300	33.5	90	2.8	60	4.7	100	10.2
2010	2,740	20.6	860	31.5	1,570	36.0	110	3.0	70	5.5	130	12.0
2020	3,190	21.6	1,050	33.8	1,770	37.0	140	3.1	80	6.3	150	13.4
2030	3,630	21.9	1,230	34.5	1,960	37.0	160	3.2	90	6.5	190	14.7
High projections[7]												
1990	1,730	16.8	480	24.0	1,070	30.5	70	2.4	40	3.7	70	8.4
2000	2,330	19.0	700	28.2	1,370	33.5	100	2.8	60	4.7	100	10.2
2010	2,990	20.6	960	31.5	1,690	36.0	130	3.0	70	5.5	140	12.0
2020	3,590	21.6	1,210	33.8	1,960	37.0	160	3.1	90	6.3	170	13.4
2030	4,170	21.9	1,450	34.5	2,220	37.0	190	3.2	100	6.5	210	14.7

[1]Hardboard, insulating board, and particleboard (including waferboard, flakeboard, composite board, and medium-density fiberboard).
[2]Includes telephone and telegraph, other public utilities, sewer systems, and water supply facilities.
[3]Includes military facilities, conservation and development, railroad construction except track construction, and all other public and private construction not included in other categories.
[4]Includes private commercial buildings such as offices, stores, warehouses, and restaurants.
[5]Includes public and private nonhousekeeping, industrial, educational, religious, hospital and institutional, farm service, and miscellaneous buildings.
[6]1972 dollars.
[7]Projections based on alternate assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: Estimates based on Forest Service surveys except highways, which were adapted from data provided by U.S. Department of Transportation, Bureau of Public Roads.

Projections: U.S. Department of Agriculture, Forest Service.

Table 1.10—*Per capita value of manufacturing shipments in the United States, by commodity group, specified years 1948–79, with projections to 2030*

Year	All products		Household furniture		Commercial and institutional furniture		Other products[1]	
	Value	Annual rate of change	Value	Annual rate of change	Value	Annual rate of change	Value	Annual rate of change
	1972 dollars	*Percent*	*1972 dollars*	*Percent*	*1972 dollars*	*Percent*	*1972 dollars*	*Percent*
1948	2,077	..	20.46	..	4.77	....	2,051	..
1950	2,143	1.6	22.33	4.5	5.91	11.4	2,115	1.6
1955	2,541	3.5	25.31	2.5	7.83	5.8	2,508	3.5
1960	2,487	−.4	24.91	−.3	9.41	3.7	2,453	−.4
1965	3,031	4.0	29.85	3.7	11.84	4.7	2,990	4.0
1970	3,255	1.4	30.75	.6	16.11	6.4	3,208	1.4
1971	3,284	.9	32.84	6.8	15.94	−1.1	3,235	.8
1972	3,509	6.9	35.43	7.9	18.67	17.1	3,455	6.8
1973	3,667	4.5	35.64	.6	18.54	−.7	3,613	4.6
1974	3,584	−2.3	30.20	−15.2	17.46	−5.8	3,537	−2.1
1975	3,270	−8.8	24.82	−17.8	14.98	−14.2	3,230	−8.7
1976	3,533	8.0	27.42	10.5	15.34	2.4	3,491	8.1
1977	3,688	4.4	29.97	9.3	18.90	23.2	3,639	4.2
1978	3,842	4.2	35.20	17.4	18.29	−3.2	3,788	4.1
1979	4,156	8.2	38.08	8.2	19.95	9.1	4,098	8.2
			Low projections[2]					
1990	4,282	[3].9	36.80	[3].6	22.40	[3]1.9	4,223	[3].9
2000	4,606	.7	39.00	.6	25.20	1.2	4,542	.7
2010	4,951	.7	41.90	.7	27.50	.9	4,882	.7
2020	5,175	.4	43.50	.4	28.90	.5	5,103	.4
2030	5,543	.7	46.10	.6	31.70	.9	5,465	.7
			Medium projections[2]					
1990	4,358	[3]1.0	37.40	[3].7	23.40	[3]2.2	4,297	[3]1.0
2000	4,752	.9	39.90	.7	26.50	1.2	4,685	.9
2010	5,146	.8	42.90	.7	29.40	1.1	5,073	.8
2020	5,386	.5	44.50	.4	31.00	.5	5,310	.5
2030	5,767	.7	47.30	.6	34.00	.9	5,686	.7
			High projections[2]					
1990	4,365	[3]1.1	37.30	[3].7	23.60	[3]2.3	4,304	[3]1.1
2000	4,718	.8	39.60	.6	26.50	1.2	4,652	.8
2010	4,985	.6	41.20	.4	28.90	.9	4,915	.6
2020	5,038	.1	41.20	0	29.70	.3	4,967	.1
2030	5,173	.3	42.00	.2	31.10	.5	5,100	.3

[1]Includes all other manufactured products except pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring, and other similar goods included in the construction and shipping sections of this study.
[2]Projections based on alternate assumptions about growth in population and economic activity as specified in Chapter 2.
[3]Rates of change calculated from the following 1976 trend level values: all products, $3,765; household furniture, $33.93; commercial and institutional furniture, $17.20; and other products, $3,714.

Note: Data may not add to totals because of rounding.

Sources: Calculated from information shown in text tables 1.1 and 3.15.

Table 1.11—*Lumber used in manufacturing in the United States, by commodity group, specified years 1948–76, with projections (base level price trends) to 2030*

Year	All products		Household furniture		Commercial and institutional furniture		Other products[1]	
	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]
	Million board feet	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*	*Million board feet*	*Board feet*
1948	3,924	0.0129	1,970	0.647	321	0.434	1,633	0.0054
1960	3,865	.0086	2,116	.474	289	.172	1,460	.0033
1965	4,609	.0078	2,987	.519	280	.122	1,342	.0023
1970	4,670	.0070	2,961	.467	271	.083	1,438	.0022
1976	4,300	.0057	2,540	.430	260	.077	1,500	.0020
				Low projections[3]				
1990	5,270	.0052	3,390	.390	290	.055	1,590	.0016
2000	5,640	.0050	3,650	.380	310	.050	1,680	.0015
2010	6,050	.0048	3,880	.370	330	.048	1,840	.0015
2020	6,160	.0046	3,960	.360	340	.047	1,860	.0014
2030	6,420	.0045	4,140	.360	370	.047	1,910	.0014
				Medium projections[3]				
1990	5,530	.0052	3,550	.390	310	.055	1,670	.0016
2000	6,130	.0050	3,950	.380	350	.050	1,830	.0015
2010	6,790	.0048	4,370	.370	390	.048	2,030	.0015
2020	7,220	.0046	4,640	.360	420	.047	2,160	.0014
2030	7,900	.0045	5,110	.360	480	.047	2,310	.0014
				High projections[3]				
1990	5,780	.0052	3,700	.390	330	.055	1,750	.0016
2000	6,610	.0050	4,260	.380	380	.050	1,970	.0015
2010	7,500	.0048	4,810	.370	440	.048	2,250	.0015
2020	8,210	.0046	5,260	.360	490	.047	2,460	.0014
2030	9,210	.0045	5,940	.360	570	.047	2,700	.0014

[1]Includes all other manufactured products except pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring, and other similar goods included in the construction and shipping sections of this study.

[2]1972 dollars. See text table 3.15 for values of shipments.

[3]Projections based on alternate assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. 1948 and 1960—*Wood used in manufacturing industries, 1960*. Stat. Bull. 353, 1965—*Wood used in manufacturing industries, 1965*. Stat. Bull. 440, 1969; 1970 and 1976—Based on estimates of value of shipments (text table 3.15) and trends in lumber use per dollar of shipments.

Projections: U.S. Department of Agriculture, Forest Service.

Table 1.12—*Veneer and plywood used in manufacturing in the United States, by commodity group, specified years 1948–76, with projections (base level price trends) to 2030*

(3/8-inch basis)

Year	All products		Household furniture		Commercial and institutional furniture		Other products[1]	
	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1948	1,126	0.0037	592	0.197	274	0.3709	260	0.0009
1960	1,822	.0041	877	.194	342	.2037	603	.0014
1965	1,562	.0027	789	.136	230	.1005	543	.0009
1970	1,656	.0025	838	.131	227	.070	591	.0009
1976	1,550	.0020	700	.120	220	.065	630	.0008
Low projections[3]								
1990	1,750	.0017	920	.105	230	.043	600	.0006
2000	1,870	.0016	980	.102	220	.036	670	.0006
2010	1,900	.0015	1,050	.100	230	.033	620	.0005
2020	1,970	.0015	1,090	.099	230	.031	650	.0005
2030	1,930	.0014	1,140	.099	240	.030	550	.0004
Medium projections[3]								
1990	1,840	.0017	960	.105	250	.043	630	.0006
2000	2,040	.0016	1,060	.102	250	.036	730	.0006
2010	2,150	.0015	1,180	.100	270	.033	700	.0005
2020	2,330	.0015	1,280	.099	280	.031	770	.0005
2030	2,400	.0014	1,410	.099	310	.030	680	.0004
High projections[3]								
1990	1,920	.0017	1,000	.105	260	.043	660	.0006
2000	2,200	.0016	1,140	.102	270	.036	790	.0006
2010	2,370	.0015	1,300	.100	300	.033	770	.0005
2020	2,660	.0015	1,450	.099	330	.031	880	.0005
2030	2,800	.0014	1,630	.099	370	.030	800	.0004

[1]Includes all other manufactured products except pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring, and other similar goods included in the construction and shipping sections of this study.

[2]1972 dollars. See text table 3.15 for values of shipments.

[3]Projections based on alternate assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. 1948 and 1960—*Wood used in manufacturing industries, 1960.* Stat. Bull. 353, 1965—*Wood used in manufacturing industries, 1965.* Stat. Bull. 440, 1969; 1970 and 1976—Based on estimates of value of shipments (text table 3.15) and trends in veneer and plywood use per dollar of shipments.

Projections: U.S. Department of Agriculture, Forest Service.

Table 1.13—*Hardboard used in manufacturing in the United States, by commodity group, 1960, 1965, 1970, and 1976, with projections (base level price trends) to 2030*

(1/8-inch basis)

Year	All products		Household furniture		Commercial and institutional furniture		Other products[1]	
	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]	Total	Per dollar of shipments[2]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1960	760	0.0017	231	0.052	145	0.086	384	0.0009
1965	1,135	.0019	526	.091	138	.060	471	.0008
1970	1,361	.0020	663	.104	127	.045	571	.0009
1976	1,380	.0018	650	.110	130	.039	600	.0008
				Low projections[3]				
1990	1,940	.0019	1,000	.115	140	.026	800	.0008
2000	2,180	.0019	1,140	.119	150	.024	890	.0008
2010	2,410	.0019	1,280	.122	150	.022	980	.0008
2020	2,540	.0019	1,360	.124	150	.021	1,030	.0008
2030	2,690	.0019	1,440	.125	160	.021	1,090	.0008
				Medium projections[3]				
1990	2,040	.0019	1,050	.115	150	.026	840	.0008
2000	2,390	.0019	1,240	.119	170	.024	980	.0008
2010	2,740	.0019	1,440	.122	180	.022	1,120	.0008
2020	3,020	.0019	1,600	.124	190	.021	1,230	.0008
2030	3,350	.0019	1,770	.125	210	.021	1,370	.0008
				High projections[3]				
1990	2,130	.0019	1,090	.115	160	.026	880	.0008
2000	2,560	.0019	1,330	.119	180	.024	1,050	.0008
2010	3,030	.0019	1,590	.122	200	.022	1,240	.0008
2020	3,440	.0019	1,810	.124	220	.021	1,410	.0008
2030	3,920	.0019	2,060	.125	260	.021	1,600	.0008

[1]Includes all other manufactured products except pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring, and other similar goods included in the construction and shipping sections of this study.
[2]1972 dollars. See text table 3.15 for values of shipments.
[3]Projections based on alternate assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. 1948 and 1960—*Wood used in manufacturing industries, 1960*. Stat. Bull. 353, 1965—*Wood used in manufacturing industries, 1965*. Stat. Bull. 440, 1969; 1970 and 1976—Based on estimates of value of shipments (text table 3.15) and trends in hardboard use per dollar of shipments.

Projections: U.S. Department of Agriculture, Forest Service.

Table 1.14—*Particleboard*[1] *used in manufacturing in the United States, by commodity group, 1960, 1965, 1970, and 1976, with projections (base level price trends) to 2030*

(¾-inch basis)

Year	All products		Household furniture		Commercial and institutional furniture		Other products[2]	
	Total	Per dollar of shipments[3]	Total	Per dollar of shipments[3]	Total	Per dollar of shipments[3]	Total	Per dollar of shipments[3]
	Million square feet	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*	*Million square feet*	*Square feet*
1960	106	0.0002	58	0.013	34	0.020	14	(4)
1965	476	.0008	312	.054	119	.052	45	0.0001
1970	960	.0014	590	.093	290	.087	80	.0001
1976	1,510	.0020	950	.160	460	.140	100	.0001
				Low projections[5]				
1990	2,330	.0023	1,430	.165	770	.145	130	.0001
2000	2,670	.0024	1,600	.167	910	.147	160	.0001
2010	3,000	.0024	1,760	.168	1,020	.148	220	.0002
2020	3,210	.0024	1,860	.169	1,090	.149	260	.0002
2030	3,400	.0025	1,950	.170	1,180	.150	270	.0002
				Medium projections[5]				
1990	2,470	.0023	1,500	.165	830	.145	140	.0001
2000	2,930	.0024	1,740	.167	1,010	.147	180	.0001
2010	3,410	.0024	1,980	.168	1,200	.148	230	.0002
2020	3,800	.0024	2,180	.169	1,340	.149	280	.0002
2030	4,260	.0025	2,410	.170	1,530	.150	320	.0002
				High projections[5]				
1990	2,590	.0023	1,570	.165	870	.145	150	.0001
2000	3,170	.0024	1,870	.167	1,100	.147	200	.0001
2010	3,790	.0024	2,180	.168	1,350	.148	260	.0002
2020	4,350	.0024	2,470	.169	1,560	.149	320	.0002
2030	5,000	.0024	2,800	.170	1,830	.150	370	.0002

[1]Includes waferboard, flakeboard, composite board, and medium-density fiberboard.
[2]Includes all other manufactured products except pallets, prefabricated wooden buildings and structural members, containers, mobile homes, millwork, flooring, and other similar goods included in the construction and shipping sections of this study.
[3]1972 dollars. See text table 3.15 for values of shipments.
[4]Less than 0.00005 square feet.
[5]Projections based on alternate assumptions about growth in population and economic activity as specified in Chapter 2.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. 1948 and 1960—*Wood used in manufacturing industries, 1960.* Stat. Bull. 353, 1965—*Wood used in manufacturing industries, 1965.* Stat. Bull. 440, 1969; 1970 and 1976—Based on estimates of value of shipments (text table 3.15) and trends in particleboard use per dollar of shipments.

Projections: U.S. Department of Agriculture, Forest Service.

Table 1.15—*Lumber consumption, exports, imports, and production in the United States, 1920–79*

Year	Consumption				Exports			Imports			Production		
	Total	Per capita	Softwoods[1]	Hardwoods	Total	Softwoods[1]	Hardwoods	Total	Softwoods[1]	Hardwoods	Total	Softwoods	Hardwoods
	Billion board feet	*Board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*	*Billion board feet*
1920	34.6	325	27.4	7.2	1.7	1.5	0.2	1.4	1.3	([2])	35.0	27.6	7.4
1921	28.5	263	23.0	5.5	1.3	1.2	.1	.8	.8	([2])	29.0	23.4	5.6
1922	34.9	317	28.8	6.1	2.0	1.7	.3	1.6	1.5	([2])	35.2	28.9	6.3
1923	40.5	362	32.9	7.6	2.5	2.2	.3	2.0	1.9	0.1	41.0	33.2	7.8
1924	38.5	337	30.8	7.7	2.7	2.4	.3	1.7	1.7	.1	39.5	31.5	8.0
1925	40.2	347	32.8	7.5	2.6	2.2	.4	1.8	1.7	.1	41.0	33.3	7.7
1926	38.8	330	31.4	7.4	2.8	2.5	.4	1.9	1.8	.1	39.8	32.1	7.7
1927	35.9	302	29.0	7.0	3.1	2.6	.4	1.7	1.6	.1	37.3	30.0	7.3
1928	35.0	290	28.5	6.5	3.2	2.8	.5	1.5	1.4	.1	36.8	29.9	6.9
1929	37.1	305	29.5	7.6	3.2	2.7	.5	1.5	1.4	.1	38.7	30.8	7.9
1930	28.2	229	22.5	5.8	2.4	1.9	.4	1.2	1.2	([2])	29.4	23.2	6.1
1931	19.0	153	15.2	3.8	1.7	1.4	.3	.7	.7	([2])	20.0	15.9	4.1
1932	12.7	102	10.3	2.5	1.2	.9	.2	.4	.4	([2])	13.5	10.8	2.7
1933	16.2	130	13.1	3.1	1.3	1.0	.3	.4	.3	([2])	17.2	13.8	3.4
1934	17.8	141	13.8	3.9	1.3	1.1	.3	.3	.3	([2])	18.8	14.6	4.2
1935	22.1	173	17.6	4.5	1.3	1.0	.3	.4	.4	.1	22.9	18.2	4.7
1936	27.0	211	21.6	5.4	1.3	.9	.3	.7	.6	.1	27.6	22.0	5.6
1937	28.2	219	22.6	5.6	1.4	1.1	.4	.7	.6	.1	29.0	23.1	5.9
1938	24.4	188	19.7	4.7	1.0	.7	.3	.5	.5	.1	24.8	20.0	4.9
1939	28.4	217	23.1	5.3	1.1	.8	.3	.7	.6	.1	28.8	23.3	5.5
1940	31.0	234	25.4	5.5	1.0	.8	.2	.7	.6	.1	31.2	25.6	5.5
1941	37.2	278	30.5	6.7	.7	.5	.1	1.4	1.2	.2	36.5	29.9	6.7
1942	37.4	276	30.6	6.8	.5	.4	.1	1.5	1.4	.1	36.3	29.5	6.8
1943	34.8	254	27.4	7.4	.3	.2	.1	.9	.7	.1	34.3	26.9	7.4
1944	33.6	242	25.7	7.8	.4	.3	.1	1.0	.8	.1	32.9	25.2	7.8
1945	28.8	205	21.7	7.0	.4	.3	.1	1.1	.9	.2	28.1	21.1	7.0
1946	34.7	244	26.3	8.4	.6	.6	.1	1.2	1.0	.2	34.1	25.9	8.3
1947	35.4	244	27.9	7.5	1.4	1.2	.2	1.3	1.1	.2	35.4	27.9	7.5
1948	38.2	260	30.7	7.5	.6	.6	.1	1.9	1.7	.2	37.0	29.6	7.4
1949	33.1	221	27.4	5.7	.7	.5	.1	1.6	1.4	.1	32.2	26.5	5.7
1950	40.9	269	33.4	7.5	.5	.4	.1	3.4	3.1	.3	38.0	30.6	7.4
1951	38.7	250	30.9	7.8	1.0	.9	.1	2.5	2.3	.3	37.2	29.5	7.7
1952	39.2	249	31.9	7.3	.7	.6	.2	2.5	2.3	.2	37.5	30.2	7.2
1953	38.9	243	31.6	7.3	.6	.5	.1	2.8	2.5	.2	36.7	29.6	7.2
1954	38.7	237	31.5	7.1	.7	.6	.1	3.1	2.9	.2	36.4	29.3	7.1
1955	40.1	242	32.5	7.6	.8	.7	.2	3.6	3.3	.3	37.4	29.8	7.6
1956	40.9	242	32.8	8.1	.8	.6	.2	3.4	3.1	.3	38.2	30.2	8.0
1957	35.0	204	29.2	5.8	.8	.6	.2	3.0	2.7	.2	32.9	27.1	5.8
1958	36.1	206	30.0	6.1	.7	.6	.2	3.4	3.2	.2	33.4	27.4	6.0
1959	40.5	228	33.7	6.8	.8	.6	.2	4.1	3.7	.3	37.2	30.5	6.7
1960	36.0	199	29.6	6.4	.9	.7	.2	3.9	3.6	.3	32.9	26.7	6.3
1961	35.5	193	29.5	6.0	.8	.6	.2	4.3	4.0	.2	32.0	26.1	6.0
1962	37.3	200	30.8	6.5	.8	.6	.1	4.9	4.6	.3	33.2	26.8	6.4
1963	39.2	207	31.8	7.3	.9	.7	.1	5.3	5.0	.3	34.7	27.6	7.2
1964	40.8	213	33.4	7.4	1.0	.8	.1	5.2	4.9	.3	36.6	29.3	7.3
1965	41.1	212	33.4	7.7	.9	.8	.1	5.2	4.9	.3	36.8	29.3	7.5
1966	40.8	207	32.8	8.0	1.0	.9	.2	5.2	4.8	.4	36.6	28.8	7.7
1967	38.8	199	31.1	7.6	1.1	1.0	.2	5.1	4.8	.3	34.7	27.3	7.4
1968	41.5	207	34.0	7.4	1.2	1.0	.1	6.2	5.8	.3	36.5	29.3	7.2
1969	41.0	202	33.2	7.8	1.1	1.0	.1	6.3	5.9	.4	35.8	28.3	7.5
1970	39.5	193	32.2	7.3	1.2	1.1	.1	6.1	5.8	.3	34.7	27.5	7.1
1971	43.5	210	36.3	7.1	1.1	.9	.2	7.6	7.2	.4	37.0	30.0	6.9
1972	45.8	219	38.8	7.0	1.4	1.2	.2	9.4	9.0	.4	37.7	31.0	6.8
1973	46.2	220	38.9	7.3	2.0	1.8	.2	9.6	9.0	.5	38.6	31.6	7.0
1974	40.1	189	33.0	7.2	1.8	1.6	.2	7.3	6.8	.4	34.6	27.7	6.9
1975	37.0	173	31.1	5.9	1.6	1.4	.2	6.0	5.7	.3	32.6	26.7	5.9
1976	42.7	198	36.2	6.5	1.8	1.6	.2	8.2	8.0	.3	36.3	29.9	6.4
1977	46.9	216	40.1	6.8	1.7	1.4	.2	10.7	10.4	.3	37.9	31.2	6.7
1978	48.7	223	41.8	7.0	1.7	1.4	.4	12.2	11.9	.4	38.3	31.3	7.0
1979[3]	47.1	213	39.8	7.3	2.1	1.8	.4	11.5	11.2	.4	37.7	30.4	7.3

[1]Includes small volumes of mixed species (not classified as softwoods or hardwoods).
[2]Less than 50 million board feet.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Lumber production and mill stocks.* Curr. Ind. Reps. Ser. MA-24T. Annual., *U.S. exports: schedule B commodity by country.* FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.

Table 1.16—*Plywood consumption, exports, imports, and production in the United States, 1950–79*

(3/8-inch basis)

Year	Consumption				Exports			Imports			Production[1]		
	Total	Per capita	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods[2]	Total	Soft-woods	Hard-woods	Total	Soft-woods	Hard-woods
	Million square feet	*Square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*	*Million square feet*
1950	......	...	2,672	.....	4	3	(3)	45	(3)	45	......	2,676	.....
1951	4,241	27	2,995	1,246	4	4	1	53	4	49	4,192	2,995	1,197
1952	4,450	28	3,166	1,284	13	13	(3)	60	1	60	4,403	3,178	1,224
1953	5,222	33	3,839	1,383	10	10	1	156	(3)	155	5,076	3,848	1,228
1954	5,405	33	3,983	1,422	7	7	1	306	(3)	306	5,106	3,989	1,116
1955	7.071	43	5,276	1,795	10	8	2	443	(3)	442	6,639	5,284	1,355
1956	7,262	43	5,418	1,844	16	15	1	498	..	498	6,780	5,432	1,347
1957	7,412	43	5,639	1,773	15	15	1	597	(3)	597	6,830	5,653	1,177
1958	8,267	47	6,475	1,792	14	12	2	643	(3)	643	7,638	6,487	1,151
1959	9,945	56	7,664	2,281	75	72	3	938	..	938	9,082	7,736	1,346
1960	9,571	53	7,757	1,814	15	13	2	725	11	715	8,861	7,759	1,102
1961	10,523	57	8,495	2,028	17	14	3	739	13	727	9,801	8,496	1,305
1962	11,716	63	9,311	2,404	19	17	2	903	13	891	10,831	9,315	1,516
1963	12,984	69	10,367	2,617	19	18	1	945	10	935	12,058	10,375	1,683
1964	14,380	75	11,431	2,949	31	28	2	1,045	5	1,040	13,366	11,455	1,912
1965	15,492	80	12,402	3,090	37	30	6	1,052	5	1,047	14,477	12,428	2,049
1966	16,126	82	12,804	3,321	56	48	8	1,257	3	1,254	14,925	12,849	2,076
1967	15,909	80	12,758	3,152	93	85	8	1,247	3	1,244	14,756	12,840	1,916
1968	18,213	91	14,332	3,882	78	64	14	1,896	10	1,886	16,395	14,385	2,009
1969	17,314	85	13,354	3,960	215	199	16	2,121	15	2,107	15,407	13,538	1,869
1970	17,822	87	14,038	3,784	172	114	58	2,049	2	2,047	15,945	14,149	1,796
1971	20,708	100	16,258	4,450	114	99	15	2,545	3	2,542	18,277	16,353	1,924
1972	22,788	109	17,629	5,159	247	221	26	3,162	6	3,156	19,873	17,843	2,030
1973	21,820	104	17,527	4,293	452	411	40	2,536	9	2,527	19,736	17,929	1,807
1974	17,746	84	14,769	2,977	610	542	68	1,649	4	1,644	16,707	15,306	1,401
1975	17,823	83	14,922	2,902	859	791	68	1,925	7	1,918	16,758	15,706	1,052
1976	20,561	96	17,202	3,360	795	716	79	2,368	12	2,356	18,989	17,906	1,083
1977	21,981	101	18,609	3,372	357	287	70	2,273	18	2,254	20,065	18,877	1,187
1978	22,903	105	19,257	3,646	328	298	30	2,555	63	2,492	20,676	19,492	1,185
1979[4]	21,391	97	18,213	3,178	430	402	29	2,097	27	2,070	19,724	18,588	1,136

[1]Includes production from both domestic and imported veneer.
[2]Includes mixed species (not classified as hardwoods or softwoods).
[3]Less than 500,000 square feet.
[4]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Softwood plywood.* Curr. Ind. Reps. Ser. MA-24H. Annual., *Hardwood plywood.* Curr. Ind. Reps. Ser. MA-24F. Annual., *U.S. exports: schedule B commodity by country.* FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.

Table 1.17—*Paper and board consumption, exports, imports, and production in the United States, 1920–79*

Year	Consumption[1] Total	Consumption[1] Per capita	Exports[2]	Imports[2]	Production	Year	Consumption[1] Total	Consumption[1] Per capita	Exports[2]	Imports[2]	Production
	Thousand tons	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*		*Thousand tons*	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1920.......	7,744	145	219	778	7,185	1950.......	29,075	382	298	4,998	24,375
1921.......	6,061	112	91	819	5,333	1951.......	30,656	396	528	5,137	26,047
1922.......	7,878	143	96	1,099	6,875	1952.......	29,092	369	499	5,173	24,418
1923.......	9,208	164	86	1,423	7,871	1953.......	31,435	392	383	5,213	26,605
1924.......	9,298	163	91	1,459	7,930	1954.......	31,454	386	591	5,168	26,876
1925.......	10,437	180	92	1,528	9,002	1955.......	34,804	420	736	5,362	30,178
1926.......	11,607	198	117	1,930	9,794	1956.......	36,573	433	670	5,802	31,441
1927.......	11,954	201	113	2,065	10,002	1957.......	35,350	411	753	5,436	30,666
1928.......	12,489	207	136	2,222	10,403	1958.......	35,206	403	729	5,112	30,823
1929.......	13,421	220	179	2,485	11,140	1959.......	38,821	437	792	5,577	34,036
1930.......	12,340	201	160	2,326	10,169	1960.......	39,217	434	902	5,675	34,444
1931.......	11,400	184	124	2,105	9,382	1961.......	40,389	440	1,042	5,733	35,698
1932.......	9,803	157	85	1,827	7,998	1962.......	42,360	454	1,003	5,820	37,543
1933.......	10,869	173	98	1,828	9,190	1963.......	43,863	464	1,149	5,781	39,231
1934.......	11,201	177	127	2,250	9,187	1964.......	46,563	485	1,496	6,356	41,703
1935.......	12,820	201	139	2,438	10,479	1965.......	49,218	507	1,641	6,769	44,091
1936.......	14,652	229	137	2,832	11,976	1966.......	52,783	537	1,811	7,481	47,113
1937.......	15,653	243	177	3,401	12,837	1967.......	52,041	524	1,956	7,071	46,926
1938.......	13,951	215	156	2,336	11,381	1968.......	55,772	556	2,480	7,007	51,245
1939.......	15,982	244	198	2,683	13,510	1969.......	59,005	582	2,601	7,419	54,187
1940.......	16,770	254	490	2,812	14,484	1970.......	58,057	567	2,698	7,239	53,516
1941.......	20,386	306	399	3,056	17,762	1971.......	59,629	576	2,995	7,538	55,086
1942.......	19,731	293	264	3,036	17,084	1972.......	64,509	618	2,942	7,994	59,457
1943.......	19,644	287	255	2,717	17,036	1973.......	66,887	636	2,847	8,430	61,304
1944.......	19,540	282	254	2,574	17,183	1974.......	64,669	610	3,517	8,255	59,930
1945.......	19,827	283	396	2,751	17,371	1975.......	55,955	524	2,876	6,310	52,521
1946.......	22,550	319	305	3,622	19,278	1976.......	63,951	594	3,196	7,249	59,898
1947.......	24,775	344	352	4,116	21,114	1977.......	67,329	621	2,953	7,559	62,722
1948.......	26,070	356	295	4,575	21,897	1978.......	70,670	646	2,922	9,258	64,333
1949.......	24,781	332	295	4,746	20,315	1979[3]......	72,755	660	3,142	9,289	66,608

[1]Includes changes in newsprint stocks for the years 1929–49.
[2]Excludes products.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Curr. Ind. Reps. Ser. M26A. Annual., *U.S. exports: schedule B commodity by country.* FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.; American Paper Institute. *Statistics of paper and paperboard.* Annual. New York.

Table 1.18—*Paper consumption, exports, imports, and production in the United States, 1920–79*

Year	Consumption[1]		Exports[2]	Imports[3]	Production	Year	Consumption[1]		Exports[2]	Imports[2]	Production
	Total	Per capita					Total	Per capita			
	Thousand tons	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*		*Thousand tons*	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1920	5,448	102	158	735	4,872	1950	16,802	221	175	4,913	12,064
1921	4,327	80	66	799	3,594	1951	17,756	229	277	5,023	13,010
1922	5,717	104	67	1,066	4,719	1952	16,961	215	326	5,090	12,197
1923	6,397	114	52	1,372	5,078	1953	17,639	220	189	5,089	12,739
1924	6,435	113	50	1,404	5,080	1954	17,821	219	326	5,070	13,077
1925	7,131	123	60	1,476	5,715	1955	19,341	233	414	5,273	14,503
1926	7,956	136	63	1,875	6,144	1956	20,767	246	340	5,688	15,419
1927	8,188	138	57	2,016	6,228	1957	19,835	231	388	5,313	14,909
1928	8,455	140	70	2,184	6,342	1958	19,527	223	346	4,986	14,887
1929	9,101	149	93	2,445	6,776	1959	21,577	243	329	5,400	16,506
1930	8,416	137	76	2,297	6,191	1960	21,983	243	361	5,534	16,809
1931	7,671	124	55	2,085	5,604	1961	22,403	244	405	5,584	17,224
1932	6,587	106	41	1,809	4,755	1962	23,246	249	351	5,631	17,966
1933	6,893	110	49	1,810	5,182	1963	23,927	253	382	5,556	18,752
1934	7,219	114	75	2,229	5,173	1964	25,369	264	432	6,117	19,685
1935	8,234	129	77	2,413	5,855	1965	26,769	276	500	6,508	20,761
1936	9,308	145	71	2,799	6,598	1966	28,846	293	540	7,238	22,148
1937	9,969	155	94	3,363	7,109	1967	28,801	290	506	6,861	22,447
1938	8,970	138	71	2,309	6,340	1968	30,157	301	541	6,727	23,971
1939	10,029	153	97	2,654	7,484	1969	31,794	314	531	7,127	25,198
1940	10,606	161	254	2,791	8,105	1970	31,699	309	547	7,028	25,219
1941	12,084	181	264	3,019	9,362	1971	32,347	312	562	7,260	25,648
1942	11,790	175	161	2,961	9,115	1972	34,351	329	577	7,577	27,351
1943	11,043	162	182	2,663	8,415	1973	35,704	339	624	7,988	28,340
1944	10,599	153	180	2,522	8,220	1974	35,498	335	934	7,937	28,496
1945	11,004	157	255	2,700	8,457	1975	30,137	282	975	6,190	24,922
1946	13,091	185	217	3,580	9,773	1976	34,466	320	958	7,041	28,383
1947	14,445	200	214	4,057	10,705	1977	36,490	336	732	7,274	29,948
1948	15,350	209	161	4,500	11,119	1978	38,389	351	580	8,800	30,168
1949	14,859	199	181	4,676	10,350	1979[3]	40,135	364	635	8,891	31,878

[1]Includes changes in newsprint stocks for the years 1929–49.
[2]Excludes products.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Curr. Ind. Reps. Ser. M26A. Annual., *U.S. exports: schedule B commodity by country.* FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.; American Paper Institute. *Statistics of paper and paperboard.* Annual. New York.

Table 1.19—*Paperboard*[1] *consumption, exports, imports, and production in the United States, 1920–79*

Year	Consumption[1]		Exports[2]	Imports[2]	Production	Year	Consumption[1]		Exports[3]	Imports[2]	Production
	Total	Per capita					Total	Per capita			
	Thousand tons	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*		*Thousand tons*	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1920.......	2,296	43	61	43	2,313	1950.......	11,047	145	98	55	11,090
1921.......	1,734	32	26	20	1,740	1951.......	11,627	150	225	81	11,771
1922.......	2,162	39	28	34	2,156	1952.......	10,821	137	147	56	10,912
1923.......	2,811	50	34	52	2,793	1953.......	12,418	155	171	98	12,491
1924.......	2,863	50	41	54	2,850	1954.......	12,140	149	240	54	12,327
1925.......	3,224	56	27	15	3,236	1955.......	13,796	166	295	45	14,045
1926.......	3,549	60	51	20	3,580	1956.......	14,111	167	300	31	14,381
1927.......	3,685	62	36	18	3,702	1957.......	13,905	162	339	44	14,200
1928.......	3,953	66	39	11	3,981	1958.......	13,955	160	362	46	14,271
1929.......	4,183	69	50	11	4,222	1959.......	15,226	171	443	45	15,624
1930.......	3,816	62	47	8	3,855	1960.......	15,365	170	521	35	15,851
1931.......	3,622	58	47	3	3,666	1961.......	16,053	175	615	39	16,629
1932.......	3,151	50	31	1	3,181	1962.......	17,048	183	630	46	17,632
1933.......	3,930	63	32	12	3,950	1963.......	17,682	187	740	42	18,380
1934.......	3,923	62	34	11	3,946	1964.......	18,740	195	1,034	20	19,753
1935.......	4,521	71	39	16	4,544	1965.......	19,885	205	1,112	18	20,979
1936.......	5,257	82	39	16	5,280	1966.......	21,541	219	1,237	56	22,722
1937.......	5,586	87	52	19	5,618	1967.......	20,833	210	1,418	22	22,229
1938.......	4,873	75	61	12	4,922	1968.......	22,783	227	1,903	28	24,659
1939.......	5,850	89	73	12	5,911	1969.......	24,212	239	2,025	20	26,217
1940.......	6,001	91	209	10	6,200	1970.......	23,530	230	2,105	19	25,616
1941.......	7,679	115	106	13	7,771	1971.......	23,916	231	2,381	23	26,274
1942.......	7,059	104	84	50	7,093	1972.......	26,378	253	2,305	13	28,670
1943.......	7,695	112	63	24	7,734	1973.......	27,307	260	2,148	40	29,415
1944.......	8,006	115	61	21	8,045	1974.......	25,718	243	2,483	40	28,161
1945.......	7,933	113	96	22	8,008	1975.......	22,765	213	1,814	12	24,567
1946.......	8,481	120	61	14	8,529	1976.......	25,850	240	2,140	20	27,970
1947.......	9,265	128	97	26	9,337	1977.......	27,039	249	2,127	32	29,135
1948.......	9,455	128	98	45	9,508	1978.......	28,139	257	2,290	105	30,324
1949.......	9,085	121	89	48	9,127	1979[3]	28,710	260	2,454	85	31,080

[1]Includes wet machine board. Also includes small quantities of building board for the years 1920–24.
[2]Excludes products.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Curr. Ind. Reps. Ser. M26A. Annual., *U.S. exports: schedule B commodity by country.* FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.; American Paper Institute. *Statistics of paper and paperboard.* Annual. New York.

Table 1.20—*Building board consumption, exports, imports, and production in the United States, 1940-79*

Year	Consumption						Exports			Imports			Production		
	Total			Per capita											
	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard	Total	Insulating board[1]	Hardboard	Total	Insulating board	Hardboard
	Thousand tons	*Thousand tons*	*Thousand tons*	*Pounds*	*Pounds*	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1940	163	.....	.....	2	..	..	27	..	..	10	..	...	179	....	....
1941	623	.....	.....	9	..	..	29	15	15	24	..	...	629	....	....
1942	882	.....	.....	13	..	..	19	..	..	25	..	...	877	....	....
1943	907	.....	.....	13	..	..	10	7	3	30	..	...	887	....	....
1944	936	.....	.....	14	..	..	13	..	..	30	..	...	918	637	281
1945	890	.....	.....	13	..	..	45	26	19	29	..	...	906	646	260
1946	977	.....	.....	14	..	..	27	..	..	28	..	...	976	....	....
1947	1,064	.....	.....	15	..	..	41	28	13	33	..	...	1,072	771	302
1948	1,266	.....	.....	17	..	..	36	18	18	31	..	...	1,270	906	365
1949	837	.....	.....	11	..	..	25	19	6	22	..	...	839	622	217
1950	1,227	.....	.....	16	..	..	25	17	8	31	..	...	1,221	838	383
1951	1,273	.....	.....	16	..	..	26	21	5	33	..	...	1,266	918	348
1952	1,310	.....	.....	17	..	..	26	18	8	27	..	...	1,309	899	410
1953	1,377	.....	.....	17	..	..	23	18	4	26	..	...	1,374	951	423
1954	1,492	1,008	485	18	12	6	25	20	5	44	19	25	1,473	1,008	465
1955	1,667	1,104	563	20	13	7	27	21	6	64	24	40	1,630	1,100	530
1956	1,696	1,106	589	20	13	7	30	23	7	84	28	56	1,642	1,102	540
1957	1,609	987	623	19	11	7	27	20	7	79	18	61	1,558	989	569
1958	1,724	1,065	660	20	12	8	20	14	6	79	22	57	1,666	1,057	609
1959	2,018	1,184	834	23	13	9	20	14	6	133	27	106	1,905	1,171	734
1960	1,869	1,101	768	21	12	9	20	14	6	106	17	88	1,784	1,098	686
1961	1,933	1,077	856	21	12	9	22	16	6	110	10	100	1,845	1,084	762
1962	2,066	1,079	987	22	12	11	22	16	6	143	15	128	1,945	1,080	865
1963	2,255	1,147	1,108	24	12	12	27	19	8	183	26	157	2,098	1,139	959
1964	2,454	1,237	1,217	26	13	13	30	19	11	219	42	177	2,265	1,215	1,050
1965	2,565	1,270	1,295	26	13	13	29	16	13	243	28	215	2,351	1,258	1,093
1966	2,396	1,162	1,234	24	12	13	35	18	16	187	25	162	2,243	1,155	1,089
1967	2,407	1,185	1,222	24	12	12	32	16	15	188	25	163	2,250	1,176	1,074
1968	2,831	1,352	1,479	28	13	15	36	17	18	252	36	216	2,615	1,333	1,282
1969	3,000	1,365	1,635	30	13	16	46	24	21	272	37	236	2,773	1,352	1,421
1970	2,828	1,239	1,590	28	12	16	45	19	26	192	39	152	2,682	1,219	1,463
1971	3,366	1,465	1,901	33	14	18	52	25	28	255	43	211	3,164	1,446	1,718
1972	3,780	1,550	2,230	36	15	21	60	26	34	404	47	357	3,436	1,529	1,908
1973	3,875	1,571	2,304	37	15	22	75	31	43	402	55	346	3,548	1,547	2,001
1974	3,452	1,283	2,169	33	12	20	100	40	59	279	28	250	3,273	1,295	1,978
1975	3,052	1,232	1,821	29	12	17	88	32	55	108	15	92	3,032	1,249	1,784
1976	3,634	1,421	2,214	34	13	21	98	32	66	188	19	169	3,545	1,434	2,110
1977	3,800	1,412	2,388	35	13	22	93	34	59	254	43	211	3,640	1,403	2,237
1978	4,142	1,456	2,687	38	13	25	52	27	26	353	58	296	3,841	1,425	2,416
1979[2]	3,910	1,391	2,520	35	13	23	53	21	32	314	53	261	3,650	1,359	2,291

[1]Includes other building board. [2]Preliminary. Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper, and board.* Curr. Ind. Reps. Ser. M26A. Annual., *U.S. exports: schedule B commodity by country.* FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.; American Paper Institute. *Statistics of paper and paperboard.* Annual. New York.

Table 1.21—*Fibrous material used in the manufacture of paper and board in the United States, specified years 1919–79*

Year	Fibrous material used				Fibrous material used per ton of paper and board produced			
	Total	Wood-pulp	Waste paper	Other	Total	Wood-pulp	Waste paper	Other
	Thousand tons	*Thousand tons*	*Thousand tons*	*Thousand tons*	*Tons*	*Tons*	*Tons*	*Tons*
1919	6,622	4,020	1,854	748	1.110	0.674	0.311	0.125
1929	11,575	6,289	3,842	1,443	1.039	.565	.345	.129
1935	10,999	6,442	3,587	969	1.050	.615	.342	.092
1939	14,177	8,650	4,366	1,161	1.049	.640	.323	.086
1940	15,493	9,782	4,668	1,044	1.070	.675	.322	.072
1941	18,856	11,364	6,075	1,418	1.062	.640	.342	.080
1942	17,858	11,038	5,495	1,325	1.045	.646	.322	.078
1943	18,199	10,635	6,368	1,196	1.068	.624	.374	.070
1944	18,747	10,502	6,859	1,385	1.091	.611	.399	.081
1945	18,969	10,825	6,800	1,344	1.092	.623	.391	.077
1946	20,752	12,092	7,278	1,382	1.077	.627	.378	.072
1947	22,788	13,253	8,009	1,526	1.079	.628	.379	.072
1948	23,411	14,375	7,585	1,452	1.069	.657	.346	.066
1949	21,451	13,636	6,600	1,215	1.056	.671	.325	.060
1950	25,904	16,509	7,956	1,439	1.062	.677	.326	.059
1951	28,265	17,737	9,071	1,457	1.085	.681	.348	.056
1952	26,378	17,286	7,881	1,211	1.080	.708	.323	.050
1953	28,469	18,684	8,531	1,255	1.072	.703	.321	.047
1954	28,045	18,989	7,857	1,200	1.044	.707	.292	.045
1955	31,835	21,454	9,041	1,340	1.056	.711	.300	.045
1956	33,386	22,998	8,836	1,551	1.062	.731	.281	.049
1957	32,058	22,459	8,493	1,105	1.045	.732	.277	.036
1958	32,157	22,483	8,671	1,003	1.043	.729	.281	.033
1959	35,549	25,155	9,414	979	1.045	.740	.277	.028
1960	35,703	25,700	9,032	971	1.036	.746	.262	.028
1961	36,595	26,683	9,018	894	1.025	.747	.253	.025
1962	38,636	28,598	9,075	963	1.029	.762	.242	.025
1963	41,117	30,220	9,613	1,285	1.048	.770	.245	.033
1964	42,860	32,088	9,843	929	1.028	.769	.236	.022
1965	45,116	34,006	10,231	879	1.023	.771	.232	.020
1966	48,466	36,922	10,564	980	1.029	.784	.224	.021
1967	47,718	36,994	9,888	836	1.017	.788	.211	.018
1968	52,429	41,303	10,222	905	1.023	.806	.199	.018
1969	55,517	43,700	10,939	878	1.025	.806	.202	.016
1970	54,614	43,192	10,594	828	1.021	.807	.198	.015
1971	56,023	44,148	11,000	875	1.017	.801	.200	.016
1972	59,942	47,347	11,703	892	1.008	.796	.197	.015
1973	62,030	48,772	12,374	883	1.012	.796	.202	.014
1974	61,277	48,341	12,098	838	1.022	.807	.202	.014
1975	53,422	42,431	10,367	625	1.017	.808	.197	.012
1976	60,156	47,541	11,874	742	1.004	.794	.198	.012
1977	61,406	48,477	12,103	826	.979	.773	.193	.013
1978	63,273	49,834	12,586	854	.984	.775	.196	.013
1979[1]	65,286	51,623	12,915	748	.980	.775	.194	.011

[1]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board.* Curr. Ind. Reps. Ser. M26A. Annual.; American Paper Institute. *Wood pulp statistics.* Annual. New York. 1972.

Table 1.22—*Woodpulp consumption, exports, imports, and production in the United States, 1920–79*

Year	Consumption		Exports	Imports	Production	Year	Consumption		Exports	Imports	Production
	Total	Per capita					Total	Per capita			
	Thousand tons	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*		*Thousand tons*	*Pounds*	*Thousand tons*	*Thousand tons*	*Thousand tons*
1920	4,696	88	32	906	3,822	1950	17,138	225	96	2,385	14,849
1921	3,544	65	28	697	2,876	1951	18,683	241	202	2,361	16,524
1922	4,756	86	25	1,259	3,522	1952	18,198	231	212	1,937	16,473
1923	5,149	92	23	1,383	3,789	1953	19,533	244	162	2,158	17,537
1924	5,214	91	32	1,523	3,723	1954	19,865	244	442	2,051	18,256
1925	5,588	97	38	1,664	3,962	1955	22,323	269	631	2,214	20,740
1926	6,092	104	34	1,731	4,395	1956	23,938	283	525	2,332	22,131
1927	5,957	100	32	1,676	4,313	1957	23,278	271	622	2,101	21,800
1928	6,232	103	33	1,755	4,511	1958	23,385	267	515	2,105	21,796
1929	6,690	110	54	1,881	4,863	1959	26,162	294	653	2,431	24,383
1930	6,412	104	48	1,830	4,630	1960	26,563	294	1,142	2,389	25,316
1931	5,952	96	53	1,596	4,409	1961	27,812	303	1,178	2,467	26,523
1932	5,194	83	48	1,482	3,760	1962	29,511	316	1,186	2,789	27,908
1933	6,139	98	79	1,942	4,276	1963	31,474	333	1,422	2,775	30,121
1934	6,099	97	143	1,806	4,436	1964	33,777	352	1,580	2,942	32,415
1935	6,687	105	172	1,933	4,926	1965	35,721	368	1,402	3,130	33,993
1936	7,779	121	193	2,278	5,695	1966	38,388	391	1,572	3,357	36,603
1937	8,645	134	323	2,395	6,573	1967	38,126	384	1,721	3,170	36,677
1938	7,503	116	140	1,710	5,934	1968	42,522	424	1,902	3,532	40,892
1939	8,880	136	140	2,026	6,993	1969	44,751	442	2,103	4,040	42,813
1940	9,703	147	481	1,225	8,960	1970	43,969	429	3,095	3,518	43,546
1941	11,205	168	329	1,158	10,375	1971	45,243	437	2,175	3,515	43,903
1942	11,642	173	378	1,237	10,783	1972	48,243	462	2,252	3,728	46,767
1943	10,685	156	301	1,306	9,680	1973	49,986	475	2,344	4,002	48,327
1944	10,962	158	218	1,072	10,108	1974	49,670	469	2,802	4,123	48,349
1945	11,786	168	135	1,754	10,167	1975	43,380	406	2,782	3,078	43,084
1946	12,373	175	39	1,805	10,607	1976	48,930	455	2,518	3,727	47,721
1947	14,138	196	130	2,322	11,946	1977	50,363	464	2,640	3,871	49,132
1948	14,955	204	94	2,176	12,872	1978	51,443	470	2,599	4,023	50,020
1949	13,848	186	122	1,763	12,207	1979[1]	51,995	471	2,935	4,318	50,612

[1]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *Pulp, paper and board*. Curr. Ind. Reps. Ser. M26A. Annual., *U.S. exports: schedule B commodity by country*. FT 410. Monthly., *U.S. imports for consumption and general imports: TSUSA commodity by country of origin*. FT 246. Annual.; American Paper Institute. *Wood pulp statistics*. Annual. New York. 1972.

Table 1.23—*Pulpwood consumption, exports, imports, and production in the United States, 1920–79*

(Million cords)

Year	Total consumption and exports	Consumption		Exports				Imports				Production				
													Roundwood			
		Total[1]	In U.S. mills	Total	Pulpwood	Woodpulp[3]	Paper and board[2 3]	Total	Pulpwood	Woodpulp[3]	Paper and board[2 3]	Total	Total	Softwoods	Hardwoods	Plant by-products[2]
1920	8.6	8.2	6.1	0.5	...	...	0.5	3.8	1.2	1.6	1.0	4.9	4.7	4.2	0.5	0.2
1921	6.9	6.6	4.6	.2	...	...	.2	3.4	1.1	1.2	1.1	3.5	3.4	3.1	.3	.1
1922	9.3	9.0	5.5	.3	...	...	.2	4.8	1.0	2.3	1.4	4.5	4.4	4.0	.5	.1
1923	10.2	10.0	5.9	.2	...	...	.2	5.7	1.3	2.4	1.9	4.5	4.4	3.9	.5	.1
1924	10.4	10.2	5.8	.3	...	0.1	.2	5.9	1.3	2.8	1.9	4.5	4.4	3.9	.5	.1
1925	11.0	10.8	6.1	.3	...	.1	.2	6.4	1.5	3.0	2.0	4.6	4.5	4.0	.5	.2
1926	12.4	12.1	6.8	.3	...	.1	.2	7.0	1.4	3.1	2.5	5.4	5.2	4.7	.5	.2
1927	12.6	12.2	6.8	.4	0.1	.1	.2	7.3	1.6	3.1	2.7	5.2	4.9	4.4	.6	.3
1928	13.3	12.9	7.2	.4	...	.1	.3	7.6	1.5	3.2	2.9	5.6	5.2	4.6	.6	.5
1929	14.4	13.9	7.6	.5	.1	.1	.3	8.0	1.4	3.4	3.2	6.3	5.8	5.1	.7	.6
1930	13.6	13.2	7.2	.5	.1	.1	.3	7.9	1.6	3.3	3.0	5.7	5.1	4.5	.7	.6
1931	12.4	12.1	6.7	.4	.1	.1	.2	6.7	1.0	2.9	2.7	5.8	5.2	4.7	.5	.6
1932	10.7	10.5	5.6	.3	...	.1	.1	5.7	.6	2.7	2.4	5.0	4.6	4.1	.4	.4
1933	12.6	12.2	6.6	.3	...	.2	.1	6.7	.7	3.6	2.4	5.9	5.4	4.7	.7	.5
1934	13.0	12.5	6.8	.5	...	.3	.2	7.2	1.0	3.4	2.9	5.8	5.6	4.9	.7	.2
1935	14.4	13.8	7.6	.6	...	.3	.2	7.8	1.0	3.6	3.1	6.6	6.3	5.6	.8	.3
1936	16.6	16.0	8.7	.6	...	.4	.2	9.1	1.2	4.2	3.6	7.5	7.2	6.2	1.0	.3
1937	19.2	18.3	10.4	.9	...	.7	.3	10.3	1.5	4.5	4.3	8.9	8.4	7.4	1.0	.5
1938	15.5	14.9	9.2	.6	.1	.3	.2	7.5	1.3	3.2	3.0	8.0	7.8	7.0	.8	.2
1939	18.0	17.4	10.8	.6	.1	.3	.3	8.3	1.1	3.7	3.4	9.7	9.5	8.5	.9	.3
1940	19.7	18.0	13.7	1.6	.1	.9	.6	7.3	1.4	2.2	3.6	12.4	12.1	10.8	1.3	.2
1941	21.9	20.6	15.7	1.3	.1	.6	.6	7.7	1.6	2.1	4.0	14.2	14.0	12.4	1.5	.2
1942	22.7	21.6	16.6	1.2	.1	.7	.4	7.8	1.7	2.3	3.8	14.9	14.8	13.1	1.7	.2
1943	20.8	19.7	14.9	1.0	...	.6	.4	7.2	1.4	2.4	3.4	13.6	13.5	11.8	1.6	.1
1944	22.0	21.1	16.7	.8	...	.4	.4	6.6	1.4	2.0	3.2	15.3	15.1	13.2	2.0	.2
1945	23.6	22.7	16.8	.9	...	.3	.6	8.3	1.6	3.2	3.5	15.3	14.9	12.8	2.1	.4
1946	26.6	26.0	18.6	.6	.1	.1	.5	9.6	1.7	3.3	4.6	17.0	16.4	14.0	2.4	.6
1947	29.8	28.9	20.3	.9	.1	.3	.6	11.3	1.8	4.2	5.2	18.5	17.7	15.3	2.4	.8
1948	31.8	31.1	22.0	.7	...	.2	.5	11.8	2.0	4.0	5.8	20.0	19.1	16.7	2.4	1.0
1949	28.2	27.5	19.0	.7	...	.2	.5	10.6	1.4	3.2	6.0	17.6	16.5	14.3	2.2	1.1
1950	32.7	32.0	22.1	.7	([4])	.2	.4	12.0	1.4	4.3	6.3	20.7	19.5	16.7	2.8	1.2
1951	38.3	37.1	27.6	1.2	([4])	.4	.8	13.2	2.5	4.2	6.5	25.1	23.7	20.1	3.6	1.4
1952	37.1	36.0	27.2	1.1	([4])	.4	.7	12.1	2.1	3.5	6.5	25.0	23.5	20.0	3.5	1.6
1953	38.3	37.4	27.9	.9	([4])	.3	.6	12.0	1.6	3.9	6.6	26.3	24.8	20.7	4.1	1.5
1954	38.8	37.1	28.5	1.7	([4])	.9	.8	11.8	1.6	3.7	6.5	27.0	25.5	20.9	4.5	1.5
1955	43.6	41.3	32.7	2.3	.1	1.2	1.0	12.6	1.8	3.9	6.8	31.0	28.6	23.4	5.2	2.4
1956	48.6	46.5	37.0	2.1	.1	1.0	.9	13.4	1.9	4.1	7.4	35.2	32.1	26.2	5.9	3.0
1957	46.7	44.3	36.1	2.4	.1	1.2	1.1	12.3	1.8	3.7	6.9	34.4	30.5	24.5	6.0	3.9
1958	44.7	42.6	34.5	2.1	.1	1.0	1.0	11.5	1.4	3.7	6.5	33.2	28.1	22.4	5.6	5.2
1959	49.2	46.7	37.8	2.5	.1	1.3	1.1	12.5	1.2	4.3	7.0	36.7	30.6	23.4	7.2	6.1
1960	52.7	49.1	41.2	3.6	.2	2.2	1.2	12.7	1.3	4.2	7.2	40.0	33.5	25.4	8.0	6.5
1961	53.2	49.4	41.4	3.9	.2	2.2	1.4	12.9	1.3	4.3	7.3	40.3	32.1	24.0	8.1	8.2
1962	56.4	52.6	44.1	3.8	.1	2.3	1.4	13.6	1.4	4.8	7.3	42.8	33.3	24.3	9.0	9.4
1963	58.4	54.0	46.3	4.4	.1	2.7	1.6	13.7	1.6	4.8	7.3	44.7	34.7	25.1	9.5	10.0
1964	63.0	57.9	50.0	5.1	.1	3.0	2.1	14.4	1.5	5.0	8.0	48.6	37.4	26.9	10.5	11.2
1965	67.4	62.4	53.5	5.0	.2	2.7	2.2	15.1	1.3	5.3	8.5	52.3	40.3	29.2	11.0	12.0
1966	72.6	67.0	57.2	5.6	.3	2.9	2.4	16.5	1.4	5.7	9.4	56.1	41.8	29.6	12.2	14.2
1967	73.4	66.9	58.4	6.5	.6	3.3	2.6	15.9	1.6	5.4	8.9	57.5	41.8	30.1	11.7	15.7
1968	77.8	70.0	61.9	7.9	1.2	3.5	3.2	16.2	1.4	5.9	8.8	61.7	44.2	32.1	12.1	17.4
1969	84.1	75.1	66.2	9.0	1.7	3.9	3.4	17.2	1.0	6.8	9.3	66.9	47.1	33.6	13.5	19.8
1970	86.9	75.7	69.6	11.2	2.0	5.7	3.5	16.4	1.1	6.0	9.2	70.5	50.2	36.7	13.6	20.2
1971	85.2	75.7	68.0	9.4	1.5	4.0	3.9	16.8	1.2	6.0	9.6	68.4	46.7	33.4	13.3	21.6
1972	88.8	78.8	70.3	10.0	2.0	4.1	3.9	17.5	1.0	6.3	10.2	71.2	46.1	31.8	14.3	25.2
1973	95.9	85.1	75.7	10.8	2.7	4.3	3.8	18.7	1.2	6.7	10.8	77.2	48.8	32.8	16.0	28.3
1974	100.5	87.2	79.7	13.2	3.1	5.3	4.8	18.6	1.0	7.1	10.6	81.9	54.0	37.0	16.9	27.9
1975	83.0	71.5	67.2	11.5	2.6	4.9	4.0	14.0	.8	5.1	8.1	69.0	44.3	31.7	12.6	24.8
1976	94.1	82.0	75.3	12.1	3.3	4.4	4.4	16.7	1.1	6.3	9.3	77.4	47.7	33.0	14.7	29.8
1977	97.4	85.1	77.7	12.3	3.4	4.8	4.1	17.6	1.3	6.5	9.7	79.8	45.8	31.1	14.7	34.0
1978	100.3	88.3	78.7	11.9	3.1	4.6	4.2	20.2	1.7	6.6	12.0	80.1	47.1	30.9	16.2	33.0
1979[5]	106.6	92.9	83.5	13.7	3.8	5.3	4.6	20.8	1.4	7.3	12.0	85.9	51.3	34.6	16.7	34.6

[1]Includes consumption of pulpwood in U.S. mills and the pulpwood equivalent of the net imports of paper, board, and woodpulp.
[2]Roundwood equivalent.
[3]Includes products.
[4]Less than 50,000 cords.
[5]Preliminary.

Note: Data may not add to total because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; and the American Pulpwood Association.

Table 1.24—*Pulpwood used in the manufacture of woodpulp in the United States, 1920–79*

Year	Pulpwood consumption		Woodpulp production	Year	Pulpwood consumption		Woodpulp production
	Total	Per ton of pulp produced			Total	Per ton of pulp produced	
	Thousand cords	*Cords*	*Thousand tons*		*Thousand cords*	*Cords*	*Thousand tons*
1920.....	6,114	1.60	3,822	1950.....	22,101	1.49	14,849
1921.....	4,557	1.58	2,876	1951.....	27,625	1.67	16,524
1922.....	5,549	1.58	3,522	1952.....	27,153	1.65	16,473
1923.....	5,873	1.55	3,789	1953.....	27,863	1.59	17,537
1924.....	5,768	1.55	3,723	1954.....	28,534	1.56	18,256
1925.....	6,094	1.54	3,962	1955.....	32,652	1.57	20,740
1926.....	6,766	1.54	4,395	1956.....	36,958	1.67	22,131
1927.....	6,751	1.57	4,313	1957.....	36,087	1.66	21,800
1928.....	7,160	1.59	4,511	1958.....	34,509	1.58	21,796
1929.....	7,645	1.57	4,863	1959.....	37,772	1.55	24,383
1930.....	7,195	1.55	4,630	1960.....	41,170	1.63	25,316
1931.....	6,723	1.52	4,409	1961.....	41,434	1.56	26,523
1932.....	5,633	1.50	3,760	1962.....	44,064	1.58	27,908
1933.....	6,582	1.54	4,276	1963.....	46,251	1.54	30,121
1934.....	6,797	1.53	4,436	1964.....	49,991	1.54	32,415
1935.....	7,628	1.55	4,926	1965.....	53,468	1.57	33,993
1936.....	8,716	1.53	5,695	1966.....	57,174	1.56	36,603
1937.....	10,394	1.58	6,573	1967.....	58,419	1.59	36,677
1938.....	9,194	1.55	5,934	1968.....	61,903	1.51	40,892
1939.....	10,816	1.55	6,993	1969.....	66,225	1.55	42,813
1940.....	13,743	1.53	8,960	1970.....	69,618	1.60	43,546
1941.....	15,736	1.52	10,375	1971.....	68,040	1.55	43,903
1942.....	16,567	1.54	10,783	1972.....	70,280	1.50	46,767
1943.....	14,935	1.54	9,680	1973.....	75,703	1.57	48,327
1944.....	16,700	1.65	10,108	1974.....	79,688	1.65	48,349
1945.....	16,776	1.65	10,167	1975.....	67,164	1.56	43,084
1946.....	18,641	1.76	10,607	1976.....	75,256	1.58	47,721
1947.....	20,293	1.70	11,946	1977.....	77,743	1.58	49,132
1948.....	22,009	1.71	12,872	1978.....	78,699	1.57	50,020
1949.....	19,029	1.56	12,207	1979[1]	83,490	1.65	50,612

[1]Preliminary.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; and the American Pulpwood Association.

Table 1.25—*Timber product consumption, exports, imports,*

(Million tons, air dry weight)

Year	All products		Products from industrial: Total				Lumber				Plywood and		
	Consumption	Production	Consumption	Exports	Imports	Production	Consumption	Exports	Imports	Production	Consumption[4]	Exports	Imports
1950	127.0	118.6	82.9	1.1	9.5	74.6	45.7	0.6	3.6	42.6	2.2	(7)	0.1
1951	125.3	118.6	82.0	1.9	8.6	75.3	43.7	1.1	2.7	42.1	2.4	(7)	.1
1952	120.2	113.5	81.3	1.6	8.3	74.6	43.8	.8	2.6	42.0	2.5	(7)	.1
1953	119.6	112.2	82.3	1.6	8.9	74.9	43.5	.7	2.9	41.3	3.0	(7)	.2
1954	117.7	110.7	82.0	2.2	9.2	75.0	43.2	.8	3.2	40.8	3.1	(7)	.3
1955	120.3	112.8	86.4	2.7	10.3	78.8	44.4	1.0	3.8	41.6	4.0	(7)	.4
1956	121.2	113.3	89.0	2.6	10.6	81.1	45.3	.9	3.6	42.6	4.1	(7)	.4
1957	111.1	104.1	80.6	2.7	9.7	73.6	38.2	.9	3.1	36.0	4.2	(7)	.4
1958	110.6	103.3	81.8	2.6	9.9	74.5	39.3	.8	3.6	36.6	4.6	(7)	.5
1959	117.5	108.8	90.4	3.0	11.6	81.7	44.1	.9	4.3	40.7	5.6	(7)	.7
1960	110.4	102.8	85.0	3.8	11.4	77.5	39.2	.9	4.1	36.0	5.3	(7)	.6
1961	109.4	102.2	85.7	4.6	11.8	78.5	38.5	.9	4.4	35.0	5.8	(7)	.6
1962	112.2	103.6	90.2	4.6	13.1	81.7	40.6	.8	5.1	36.4	6.5	(7)	.7
1963	116.8	109.5	96.2	6.3	13.6	88.9	43.0	.9	5.5	38.4	7.2	(7)	.8
1964	121.2	114.2	102.0	7.2	14.2	94.9	44.7	1.0	5.4	40.3	8.0	(7)	.9
1965	123.6	116.4	105.8	7.5	14.8	98.5	45.1	1.0	5.5	40.6	8.6	(7)	.9
1966	125.9	118.9	109.5	8.7	15.8	102.4	45.0	1.1	5.5	40.6	9.0	(7)	1.1
1967	121.0	117.2	105.9	11.4	15.2	102.0	42.8	1.2	5.4	38.6	8.8	0.1	1.1
1968	127.3	124.8	113.7	14.6	17.1	111.1	45.3	1.2	6.4	40.1	10.1	.1	1.5
1969	127.5	124.3	115.4	15.1	18.3	112.2	45.1	1.2	6.6	39.7	9.7	.2	1.6
1970	122.7	123.1	112.2	17.7	17.3	112.6	43.4	1.3	6.3	38.3	10.0	.1	1.6
1971	129.3	124.9	119.6	14.9	19.4	115.1	47.1	1.2	7.8	40.4	11.6	.2	1.9
1972	136.6	132.8	127.3	18.6	22.4	123.5	49.2	1.5	9.7	41.0	12.8	.2	2.4
1973	139.9	138.0	130.1	20.8	22.8	128.1	49.9	2.0	9.9	42.0	12.1	.3	2.0
1974	129.8	130.2	119.4	20.2	19.8	119.8	43.9	1.8	7.6	38.1	9.8	.4	1.4
1975	118.4	121.6	107.3	19.0	15.8	110.5	39.9	1.7	6.1	35.5	9.8	.6	1.5
1976	133.8	135.6	122.1	21.6	19.9	123.9	45.9	1.9	8.4	39.4	11.4	.5	1.8
1977	142.7	140.6	130.3	20.6	22.7	128.2	50.3	1.8	10.9	41.1	12.1	.3	1.8
1978	149.3	144.7	136.1	21.4	26.0	131.5	52.2	2.0	12.5	41.7	12.6	.3	1.9
1979[p]	148.9	148.3	133.7	24.8	25.3	133.1	50.7	2.3	11.8	41.3	11.8	.3	1.6

[1] Includes hardboard, insulating board, particleboard, and medium-density fiberboard.
[2] Excludes woodpulp used in hardboard and insulating board.
[3] Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.
[4] Excludes veneer produced and consumed in industries other than the plywood industry.
[5] Includes pulpwood (except chips), woodpulp, and the woodpulp equivalent of paper and board except hardboard and insulating board.
[6] Includes both woodpulp and the woodpulp equivalent of paper and board except hardboard and insulating board.
[7] Less than 50,000 tons.
[8] Judgment estimate subject to major revisions.
[p] Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; and the American Plywood Association.

and production in the United States, by product, 1950–79

(Million tons, air dry weight)

roundwood													
veneer	Panel products[1]				Woodpulp[2]				Miscellaneous products[3]—production and consumption	Log exports	Pulpwood chip exports	Fuelwood—production and consumption
Production[4]	Consumption	Exports	Imports	Production	Consumption	Exports[5]	Imports[6]	Production				
2.1	1.3	([7])	([7])	1.3	19.3	0.3	5.7	13.9	14.5	0.2	. . .	44.1
2.3	1.3	([7])	([7])	1.3	20.9	.6	5.8	15.6	13.8	.3	. . .	43.3
2.5	1.4	([7])	([7])	1.4	20.4	.6	5.6	15.4	13.1	.2	. . .	39.0
2.8	1.4	([7])	([7])	1.4	21.8	.4	5.8	16.4	12.7	.4	. . .	37.3
2.8	1.6	([7])	([7])	1.5	21.9	.9	5.7	17.1	12.3	.4	. . .	35.7
3.6	1.8	([7])	0.1	1.7	24.4	1.2	6.1	19.5	11.9	.5	. . .	33.9
3.7	1.9	([7])	.1	1.8	26.4	1.1	6.5	21.0	11.4	.6	. . .	32.2
3.7	1.9	([7])	.1	1.8	25.5	1.3	6.0	20.7	10.9	.4	. . .	30.5
4.1	2.1	([7])	.1	2.0	25.3	1.2	5.8	20.6	10.5	.5	. . .	28.8
4.9	2.5	([7])	.1	2.3	28.2	1.4	6.5	23.1	10.0	.6	. . .	27.1
4.7	2.3	([7])	.1	2.2	28.7	2.0	6.6	24.1	9.6	.8	. . .	25.4
5.2	2.4	([7])	.1	2.3	29.8	2.2	6.7	25.3	9.2	1.5	. . .	23.7
5.8	2.7	([7])	.1	2.5	31.6	2.1	7.1	26.6	8.7	1.6	. . .	22.0
6.4	3.0	([7])	.2	2.8	33.4	2.4	7.1	28.7	9.6	2.9	. . .	20.6
7.1	3.4	([7])	.2	3.2	35.8	2.8	7.7	31.0	10.1	3.3	. . .	19.2
7.7	3.8	([7])	.2	3.5	37.9	2.7	8.2	32.5	10.5	3.6	0.1	17.9
7.9	3.9	([7])	.2	3.7	41.1	3.1	9.1	35.1	10.5	4.2	.3	16.5
7.8	4.0	([7])	.2	3.9	40.6	3.4	8.6	35.4	9.6	5.9	.7	15.1
8.7	4.9	([7])	.3	4.7	44.3	4.0	9.0	39.3	9.0	7.7	1.5	13.7
8.2	5.5	0.1	.3	5.3	46.6	4.3	9.8	41.1	8.5	7.2	2.2	12.1
8.6	5.4	.1	.2	5.3	45.5	5.4	9.2	41.7	7.9	8.2	2.6	10.5
9.8	6.9	.1	.3	6.7	46.3	4.7	9.3	41.7	7.7	6.9	2.0	9.8
10.5	8.3	.1	.4	8.0	49.4	4.7	9.8	44.4	7.5	9.4	2.5	9.3
10.5	8.9	.2	.4	8.7	51.6	4.7	10.4	45.8	7.5	10.1	3.5	9.9
8.9	7.9	.3	.3	7.8	50.5	5.9	10.6	45.8	7.3	8.0	3.9	10.4
8.9	7.0	.2	.1	7.1	43.4	5.3	8.1	40.7	7.1	8.0	3.2	11.1
10.1	8.7	.2	.3	8.7	49.2	5.2	9.3	45.1	6.9	9.8	3.9	11.7
10.6	9.9	.2	.5	9.6	50.9	5.1	9.5	46.5	7.2	9.2	4.0	[8]12.4
11.0	10.8	.1	.6	10.3	53.1	5.1	11.0	47.2	7.4	10.3	3.6	[8]13.3
10.5	10.1	.2	.6	9.6	53.5	5.7	11.3	48.0	7.6	11.7	4.5	[8]15.2

Table 1.26—*Roundwood consumption, exports, imports,*

(Billion cubic feet, roundwood equivalent)

Year	All products		Industrial roundwood								
			Total				Lumber				Plywood
	Consumption	Production	Consumption	Exports	Imports	Production	Consumption	Exports	Imports	Production	Consumption
1950	12.2	10.8	9.9	0.1	1.5	8.5	6.4	0.1	0.5	5.9	0.3
1951	12.2	11.0	10.0	.3	1.5	8.7	6.0	.2	.4	5.8	.4
1952	11.9	10.8	9.9	.2	1.4	8.8	6.1	.1	.4	5.8	.4
1953	11.9	10.7	10.0	.2	1.4	8.8	6.0	.1	.4	5.7	.5
1954	11.8	10.6	9.9	.3	1.5	8.8	6.0	.1	.5	5.6	.5
1955	12.2	11.0	10.5	.3	1.6	9.2	6.2	.1	.6	5.8	.6
1956	12.6	11.3	11.0	.3	1.6	9.6	6.3	.1	.5	5.9	.6
1957	11.3	10.2	9.8	.3	1.5	8.6	5.4	.1	.5	5.1	.6
1958	11.2	10.0	9.7	.3	1.5	8.5	5.6	.1	.5	5.2	.7
1959	12.1	10.8	10.7	.4	1.7	9.4	6.3	.1	.6	5.7	.8
1960	11.4	10.2	10.1	.5	1.7	8.9	5.6	.1	.6	5.1	.8
1961	11.2	10.0	10.0	.5	1 7	8.8	5.5	.1	.7	4.9	.8
1962	11.6	10.2	10.4	.5	1.9	9.0	5.8	.1	.8	5.1	.9
1963	12.0	10.6	10.9	.6	2.0	9.6	6.1	.1	.8	5.4	1.0
1964	12.5	11.2	11.5	.7	2.0	10.2	6.3	.1	.8	5.6	1.0
1965	12.8	11.5	11.9	.7	2.1	10.6	6.3	.1	.8	5.7	1.1
1966	12.9	11.5	12.1	.8	2.2	10.7	6.3	.2	.8	5.6	1.1
1967	12.4	11.2	11.6	1.0	2.2	10.4	5.9	.2	.8	5.3	1.1
1968	12.9	11.8	12.2	1.2	2.4	11.1	6.3	.2	1.0	5.5	1.3
1969	12.9	11.7	12.3	1.3	2.5	11.0	6.2	.2	1.0	5.4	1.2
1970	12.5	11.6	12.0	1.5	2.4	11.1	6.0	.2	1.0	5.2	1.2
1971	12.9	11.5	12.4	1.3	2.7	11.0	6.4	.2	1.1	5.4	1.4
1972	13.4	11.9	13.0	1.5	3.1	11.4	6.7	.2	1.4	5.5	1.5
1973	13.8	12.4	13.3	1.8	3.2	11.9	6.8	.3	1.5	5.7	1.5
1974	13.0	12.1	12.5	1.8	2.8	11.5	5.9	.3	1.1	5.1	1.3
1975	11.7	11.1	11.1	1.7	2.2	10.6	5.6	.3	.9	4.9	1.3
1976	13.4	12.4	12.8	1.9	2.8	11.8	6.5	.3	1.3	5.5	1.5
1977	14.1	12.6	13.5	1.8	3.3	12.0	7.1	.3	1.7	5.7	1.6
1978	14.8	12.9	14.1	1.8	3.8	12.2	7.5	.3	1.9	5.8	1.6
1979[5]	14.8	13.3	14.1	2.1	3.7	12.5	7.1	.3	1.8	5.7	1.5

[1]Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.
[2]Includes both pulpwood and pulpwood equivalent of woodpulp, paper, and board.
[3]Less than 50 million cubic feet.
[4]Judgment estimate subject to major revisions.
[5]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; and the American Plywood Association.

and production, in the United States, by product, 1950–79

(Billion cubic feet, roundwood equivalent)

used for—— and veneer: Exports	and veneer: Imports	and veneer: Production	Pulp products: Consumption	Pulp products: Exports[2]	Pulp products: Imports[2]	Pulp products: Production	Miscellaneous products[1]—production and consumption	Logs: Exports	Logs: Imports	Pulpwood chip exports	Fuelwood—production and consumption
(3)	(3)	0.3	2.4	0.1	0.9	1.5	0.8	(3)	0.1	..	2.3
(3)	(3)	.4	2.8	.1	1.0	1.8	.7	(3)	(3)	..	2.2
(3)	(3)	.4	2.7	.1	.9	1.8	.7	(3)	(3)	..	2.0
(3)	(3)	.5	2.8	.1	.9	1.9	.7	(3)	(3)	..	1.9
(3)	(3)	.5	2.7	.1	.9	2.0	.7	(3)	(3)	..	1.8
(3)	(3)	.6	3.0	.2	1.0	2.2	.6	(3)	(3)	..	1.7
(3)	(3)	.6	3.4	.2	1.0	2.5	.6	(3)	(3)	..	1.7
(3)	(3)	.6	3.1	.2	1.0	2.4	.6	(3)	(3)	..	1.6
(3)	0.1	.6	2.9	.2	.9	2.2	.6	(3)	(3)	..	1.5
(3)	.1	.7	3.1	.2	1.0	2.4	.5	(3)	(3)	..	1.4
(3)	.1	.7	3.3	.3	1.0	2.6	.5	(3)	(3)	..	1.3
(3)	.1	.8	3.2	.3	1.0	2.5	.5	0.1	(3)	..	1.2
(3)	.1	.8	3.3	.3	1.1	2.6	.5	.1	(3)	..	1.1
(3)	.1	.9	3.4	.3	1.1	2.7	.5	.2	(3)	..	1.1
(3)	.1	1.0	3.6	.4	1.1	2.9	.5	.2	(3)	..	1.0
(3)	.1	1.0	3.9	.4	1.2	3.1	.6	.2	(3)	(3)	.9
(3)	.1	1.0	4.1	.4	1.3	3.2	.6	.2	(3)	(3)	.8
(3)	.1	1.0	4.0	.5	1.2	3.2	.5	.3	(3)	(3)	.8
(3)	.2	1.1	4.1	.5	1.3	3.4	.5	.4	(3)	0.1	.7
(3)	.2	1.0	4.4	.6	1.3	3.6	.5	.4	(3)	.1	.6
(3)	.2	1.0	4.4	.7	1.3	3.8	.4	.5	(3)	.1	.5
(3)	.2	1.2	4.3	.6	1.3	3.6	.4	.4	(3)	.1	.5
(3)	.3	1.3	4.3	.6	1.4	3.5	.4	.5	(3)	.1	.5
(3)	.2	1.3	4.6	.6	1.5	3.8	.4	.6	(3)	.2	.5
(3)	.2	1.1	4.9	.8	1.5	4.2	.4	.5	(3)	.2	.5
0.1	.2	1.2	3.9	.7	1.1	3.5	.4	.5	(3)	.2	.6
.1	.2	1.4	4.4	.7	1.3	3.8	.4	.6	(3)	.2	.6
(3)	.2	1.4	4.3	.7	1.4	3.6	.4	.5	(3)	.3	[4].6
(3)	.2	1.5	4.6	.7	1.6	3.7	.4	.6	(3)	.2	[4].7
(3)	.2	1.4	4.9	.8	1.6	4.1	.4	.7	(3)	.3	[4].8

Table 1.27—*Softwood roundwood consumption, exports, imports,*

(Billion cubic feet, roundwood equivalent)

Year	All products		Industrial roundwood: Total				Lumber				Plywood
	Consumption	Production	Consumption	Exports	Imports	Production	Consumption	Exports	Imports	Production	Consumption
1950	8.4	7.2	7.9	0.1	1.4	6.6	5.2	0.1	0.5	4.8	0.2
1951	8.3	7.2	7.8	.2	1.3	6.7	4.8	.1	.4	4.6	.2
1952	8.4	7.3	7.9	.2	1.3	6.8	5.0	.1	.4	4.7	.2
1953	8.4	7.3	8.0	.2	1.3	6.8	4.9	.1	.4	4.6	.3
1954	8.3	7.2	7.9	.2	1.3	6.8	4.9	.1	.4	4.6	.3
1955	8.7	7.5	8.3	.3	1.5	7.1	5.0	.1	.5	4.6	.4
1956	9.0	7.8	8.7	.3	1.5	7.4	5.1	.1	.5	4.7	.4
1957	8.2	7.1	7.9	.3	1.3	6.8	4.5	.1	.4	4.2	.4
1958	8.1	7.0	7.8	.2	1.3	6.7	4.6	.1	.5	4.2	.5
1959	8.9	7.7	8.6	.3	1.5	7.4	5.2	.1	.6	4.7	.6
1960	8.3	7.2	8.1	.4	1.5	6.9	4.6	.1	.6	4.1	.6
1961	8.2	7.0	8.0	.4	1.6	6.8	4.6	.1	.6	4.0	.6
1962	8.5	7.2	8.3	.4	1.7	7.0	4.8	.1	.7	4.1	.7
1963	8.8	7.5	8.6	.5	1.8	7.3	4.9	.1	.8	4.3	.7
1964	9.2	8.0	9.0	.6	1.8	7.8	5.2	.1	.8	4.5	.8
1965	9.6	8.3	9.4	.6	1.9	8.1	5.2	.1	.8	4.5	.9
1966	9.6	8.3	9.4	.7	2.0	8.1	5.1	.1	.7	4.4	.9
1967	9.2	8.2	9.1	.9	1.9	8.0	4.8	.2	.7	4.2	.9
1968	9.8	8.8	9.7	1.1	2.1	8.6	5.2	.2	.9	4.5	1.0
1969	9.7	8.6	9.5	1.1	2.1	8.5	5.0	.2	.9	4.3	.9
1970	9.5	8.7	9.4	1.3	2.1	8.6	4.9	.2	.9	4.1	.9
1971	9.9	8.7	9.8	1.1	2.3	8.6	5.3	.1	1.1	4.3	1.0
1972	10.3	9.0	10.2	1.3	2.6	8.9	5.7	.2	1.3	4.5	1.1
1973	10.6	9.4	10.5	1.5	2.7	9.3	5.7	.3	1.4	4.6	1.2
1974	9.8	8.9	9.7	1.5	2.4	8.8	4.8	.2	1.0	4.0	1.0
1975	9.0	8.5	8.9	1.5	1.9	8.4	4.6	.2	.9	3.9	1.0
1976	10.4	9.5	10.2	1.6	2.5	9.3	5.4	.3	1.2	4.4	1.2
1977	11.0	9.6	10.8	1.6	3.0	9.4	6.0	.2	1.6	4.6	1.3
1978	11.5	9.7	11.3	1.6	3.4	9.5	6.3	.2	1.8	4.7	1.4
1979[5]	11.3	9.9	11.2	1.8	3.3	9.7	5.9	.3	1.7	4.5	1.3

[1]Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.

[2]Includes both pulpwood and pulpwood equivalent of woodpulp, paper, and board.

[3]Less than 50 million cubic feet.

[4]Judgment estimate subject to major revisions.

[5]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; and the American Plywood Association.

and production in the United States, by product, 1950–79

(Billion cubic feet, roundwood equivalent)

used for—											
and veneer			Pulp products				Miscellaneous products[1]—production and consumption	Logs		Pulpwood chip exports	Fuelwood—production and consumption
Exports	Imports	Production	Consumption	Exports[2]	Imports[2]	Production		Exports	Imports		
(3)	(3)	0.2	2.1	(3)	0.9	1.3	0.4	(3)	(3)	..	0.5
(3)	(3)	.2	2.4	0.1	1.0	1.5	.3	(3)	(3)	..	.5
(3)	(3)	.2	2.4	.1	.9	1.5	.3	(3)	(3)	..	.5
(3)	(3)	.3	2.4	.1	.9	1.6	.3	(3)	(3)	..	.4
(3)	(3)	.3	2.4	.1	.9	1.6	.3	(3)	(3)	..	.4
(3)	(3)	.4	2.6	.1	.9	1.8	.3	(3)	(3)	..	.4
(3)	(3)	.4	2.9	.1	1.0	2.0	.3	(3)	(3)	..	.4
(3)	(3)	.4	2.6	.2	.9	1.9	.3	(3)	(3)	..	.3
(3)	(3)	.5	2.4	.1	.8	1.7	.3	(3)	(3)	..	.3
(3)	(3)	.6	2.6	.2	.9	1.8	.3	(3)	(3)	..	.3
(3)	(3)	.6	2.7	.2	.9	2.0	.3	(3)	(3)	..	.3
(3)	(3)	.6	2.6	.2	.9	1.8	.3	0.1	(3)	..	.2
(3)	(3)	.7	2.6	.2	1.0	1.9	.2	.1	(3)	..	.2
(3)	(3)	.7	2.7	.3	1.0	1.9	.3	.1	(3)	..	.2
(3)	(3)	.8	2.8	.3	1.0	2.0	.3	.2	(3)	..	.2
(3)	(3)	.9	3.0	.3	1.1	2.2	.3	.2	(3)	(3)	.2
(3)	(3)	.9	3.1	.3	1.2	2.2	.3	.2	(3)	(3)	.2
(3)	(3)	.9	3.1	.4	1.2	2.3	.3	.3	(3)	(3)	.2
(3)	(3)	1.0	3.2	.4	1.2	2.4	.3	.4	(3)	0.1	.1
(3)	(3)	.9	3.3	.4	1.2	2.5	.3	.4	(3)	.1	.1
(3)	(3)	.9	3.4	.5	1.2	2.8	.2	.5	(3)	.1	.1
(3)	(3)	1.0	3.3	.5	1.2	2.5	.2	.4	(3)	.1	.1
(3)	(3)	1.2	3.2	.5	1.3	2.4	.2	.5	(3)	.1	.1
(3)	(3)	1.2	3.4	.5	1.4	2.5	.2	.6	(3)	.2	.1
(3)	(3)	1.0	3.7	.6	1.4	2.9	.2	.4	(3)	.2	.1
0.1	(3)	1.1	3.0	.5	1.0	2.5	.2	.4	(3)	.2	.1
.1	(3)	1.3	3.3	.5	1.2	2.6	.2	.5	(3)	.2	.1
(3)	(3)	1.3	3.2	.5	1.3	2.5	.2	.5	(3)	.3	[4].1
(3)	(3)	1.4	3.4	.5	1.5	2.5	.3	.6	(3)	.2	[4].1
(3)	(3)	1.3	3.7	.6	1.5	2.8	.3	.6	(3)	.3	[4].2

Table 1.28—*Hardwood roundwood consumption, exports, imports,*

(Billion cubic feet, roundwood equivalent)

Year	All products		Industrial roundwood							
			Total				Lumber			
	Consumption	Production	Consumption	Exports	Imports	Production	Consumption	Exports	Imports	Production
1950	3.7	3.6	2.0	([3])	0.1	1.9	1.2	([3])	([3])	1.1
1951	3.9	3.8	2.2	([3])	.1	2.1	1.2	([3])	([3])	1.2
1952	3.5	3.5	2.0	([3])	.1	1.9	1.1	([3])	([3])	1.1
1953	3.5	3.4	2.0	([3])	.1	2.0	1.1	([3])	([3])	1.1
1954	3.4	3.4	2.0	([3])	.1	1.9	1.1	([3])	([3])	1.1
1955	3.5	3.4	2.2	0.1	.2	2.1	1.2	([3])	([3])	1.2
1956	3.6	3.5	2.3	.1	.2	2.2	1.2	([3])	([3])	1.2
1957	3.1	3.1	1.9	.1	.2	1.8	.9	([3])	([3])	.9
1958	3.1	3.0	1.9	.1	.2	1.8	.9	([3])	([3])	.9
1959	3.2	3.1	2.1	.1	.2	2.0	1.0	([3])	([3])	1.0
1960	3.1	3.0	2.1	.1	.2	2.0	1.0	([3])	([3])	1.0
1961	3.0	2.9	2.0	.1	.2	1.9	.9	([3])	([3])	.9
1962	3.1	3.0	2.2	.1	.2	2.1	1.0	([3])	([3])	1.0
1963	3.2	3.1	2.3	.1	.2	2.2	1.1	([3])	([3])	1.1
1964	3.2	3.1	2.4	.1	.2	2.3	1.1	([3])	([3])	1.1
1965	3.3	3.2	2.5	.1	.2	2.4	1.2	([3])	0.1	1.1
1966	3.3	3.2	2.7	.1	.3	2.5	1.2	([3])	.1	1.2
1967	3.1	3.0	2.5	.2	.2	2.4	1.2	([3])	.1	1.1
1968	3.1	3.0	2.6	.2	.3	2.4	1.1	([3])	.1	1.1
1969	3.2	3.0	2.7	.2	.4	2.5	1.2	([3])	.1	1.1
1970	3.0	2.9	2.6	.2	.3	2.5	1.1	([3])	.1	1.1
1971	3.0	2.8	2.6	.2	.4	2.4	1.1	([3])	.1	1.1
1972	3.1	2.9	2.7	.2	.4	2.5	1.1	([3])	.1	1.0
1973	3.3	3.1	2.9	.2	.4	2.7	1.2	([3])	.1	1.1
1974	3.2	3.2	2.8	.3	.3	2.7	1.1	([3])	.1	1.1
1975	2.7	2.6	2.2	.2	.3	2.2	1.0	([3])	([3])	1.0
1976	3.0	2.9	2.6	.2	.3	2.5	1.1	([3])	([3])	1.1
1977	3.1	3.0	2.6	.2	.4	2.5	1.1	([3])	.1	1.1
1978	3.4	3.3	2.8	.3	.4	2.7	1.2	0.1	.1	1.2
1979[5]	3.5	3.4	2.9	.3	.4	2.8	1.2	.1	.1	1.2

[1]Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.
[2]Includes both pulpwood and the pulpwood equivalent of woodpulp, paper, and board.
[3]Less than 50 million cubic feet.
[4]Judgment estimate subject to major revisions.
[5]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Associatition; the National Forest Products Association; and American Plywood Association.

and production in the United States, by product, 1950–79

(Billion cubic feet, roundwood equivalent)

used for—											
Plywood and veneer				Pulp products				Miscellaneous products[1]—production and consumption	Logs		Fuelwood—production and consumption
Consumption	Exports	Imports	Production	Consumption	Exports[2]	Imports[2]	Production		Exports	Imports	
0.2	([3])	([3])	0.2	0.3	([3])	0.1	0.2	0.4	([3])	([3])	1.7
.2	([3])	([3])	.2	.3	([3])	.1	.3	.4	([3])	([3])	1.7
.2	([3])	([3])	.2	.3	([3])	.1	.3	.4	([3])	([3])	1.5
.2	([3])	([3])	.2	.4	([3])	.1	.3	.4	([3])	([3])	1.5
.2	([3])	([3])	.2	.4	([3])	.1	.3	.3	([3])	([3])	1.4
.2	([3])	([3])	.2	.4	([3])	.1	.4	.3	([3])	([3])	1.4
.2	([3])	([3])	.2	.5	([3])	.1	.5	.3	([3])	([3])	1.3
.2	([3])	([3])	.2	.5	([3])	.1	.5	.3	([3])	([3])	1.2
.2	([3])	0.1	.2	.5	([3])	.1	.4	.3	([3])	([3])	1.2
.2	([3])	.1	.2	.6	([3])	.1	.6	.3	([3])	([3])	1.1
.2	([3])	.1	.2	.6	0.1	.1	.6	.3	([3])	([3])	1.0
.2	([3])	.1	.1	.6	.1	.1	.6	.2	([3])	([3])	1.0
.2	([3])	.1	.1	.7	.1	.1	.7	.2	([3])	([3])	.9
.2	([3])	.1	.1	.7	.1	.1	.7	.2	([3])	([3])	.9
.2	([3])	.1	.2	.8	.1	.1	.8	.3	([3])	([3])	.8
.3	([3])	.1	.2	.8	.1	.1	.9	.3	([3])	([3])	.7
.2	([3])	.1	.1	.9	.1	.1	.9	.3	([3])	([3])	.7
.2	([3])	.1	.1	.9	.1	.1	.9	.2	([3])	([3])	.6
.3	([3])	.2	.1	.9	.1	.1	.9	.2	([3])	([3])	.6
.3	([3])	.2	.1	1.0	.1	.1	1.0	.2	([3])	([3])	.5
.3	([3])	.2	.1	1.0	.2	.1	1.0	.2	([3])	([3])	.4
.3	([3])	.2	.1	1.0	.2	.1	1.0	.2	([3])	([3])	.4
.4	([3])	.3	.1	1.1	.2	.1	1.1	.2	([3])	([3])	.4
.3	([3])	.2	.1	1.2	.2	.1	1.2	.2	([3])	([3])	.4
.2	([3])	.1	.1	1.2	.2	.1	1.3	.2	([3])	([3])	.4
.2	([3])	.2	.1	.9	.2	.1	1.0	.2	([3])	([3])	.5
.3	([3])	.2	.1	1.1	.2	.1	1.2	.1	([3])	([3])	.5
.3	([3])	.2	.1	1.1	.2	.1	1.2	.1	([3])	([3])	[4].5
.3	([3])	.2	.1	1.2	.2	.1	1.3	.2	([3])	([3])	[4].5
.3	([3])	.2	.1	1.2	.2	.1	1.3	.2	([3])	([3])	[4].6

Table 1.29—*Sawtimber consumption, exports, imports,*

(Billion board feet, International ¼-inch log rule)

Year	All products		Industrial sawtimber							
			Total				Lumber			
	Consumption	Production	Consumption	Exports[2]	Imports	Production	Consumption	Exports	Imports
1950	52.5	49.4	49.9	0.5	3.7	46.8	40.6	0.5	3.4
1951	51.4	49.7	48.9	1.1	2.8	47.2	38.5	1.0	2.5
1952	51.6	49.7	49.3	.8	2.7	47.4	39.0	.7	2.5
1953	52.0	49.5	49.9	.7	3.2	47.4	38.8	.6	2.8
1954	51.9	49.1	50.2	.9	3.7	47.4	38.6	.7	3.1
1955	54.5	51.4	53.0	1.0	4.1	49.9	40.0	.8	3.6
1956	55.7	52.7	54.4	1.0	4.0	51.4	40.7	.8	3.4
1957	49.9	47.2	48.7	1.0	3.7	46.0	35.0	.8	3.0
1958	50.1	47.1	49.0	.9	3.9	46.0	36.0	.7	3.4
1959	55.8	52.9	54.8	1.1	4.9	51.0	40.4	.8	4.1
1960	51.4	48.1	50.5	1.2	4.5	47.2	35.9	.9	3.9
1961	51.0	47.5	50.1	1.4	4.9	46.6	35.5	.8	4.3
1962	53.3	49.2	52.5	1.5	5.6	48.4	37.2	.8	4.9
1963	56.0	52.1	55.3	2.1	6.0	51.4	39.1	.9	5.3
1964	58.6	55.1	57.9	2.4	5.9	54.4	40.7	1.0	5.2
1965	59.6	56.1	59.0	2.4	5.9	55.5	41.0	.9	5.2
1966	59.7	56.4	59.1	2.7	6.0	55.8	40.6	1.0	5.2
1967	57.1	54.9	56.6	3.6	5.8	54.4	38.7	1.1	5.1
1968	61.3	58.5	60.8	4.4	7.2	58.0	41.5	1.2	6.2
1969	60.6	57.3	60.2	4.1	7.4	56.9	41.0	1.1	6.3
1970	60.7	58.2	60.3	4.8	7.3	57.8	40.3	1.2	6.1
1971	64.3	59.4	63.9	4.1	9.0	59.0	42.7	1.1	7.6
1972	67.4	61.9	66.9	5.4	10.9	61.4	44.8	1.4	9.3
1973	67.6	63.1	67.1	6.3	10.8	62.6	44.8	2.0	9.4
1974	60.5	57.8	59.9	5.4	8.1	57.2	38.6	1.8	7.1
1975	55.4	53.6	54.8	5.2	7.0	53.0	35.4	1.6	5.9
1976	63.0	59.7	62.3	6.0	9.4	59.0	40.8	1.8	8.1
1977	67.5	61.4	66.7	5.7	11.8	60.6	44.7	1.6	10.4
1978	70.2	62.8	69.3	6.0	13.4	61.9	46.6	1.8	12.0
1979[5]	68.8	63.4	67.7	7.1	12.5	62.3	44.9	2.2	11.3

[1]Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.
[2]Does not include sawtimber used in exported pulp products.
[3]Less than 50 million board feet.
[4]Judgment estimate subject to major revisions.
[5]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; and American Plywood Association.

and production in the United States, by product, 1950–79

(Billion board feet, International ¼-inch log rule)

used for——										
	Plywood and veneer				Pulp products—production and consumption	Miscellaneous products[1]—production and consumption	Logs		Fuelwood—production and consumption
Production	Consumption	Exports	Imports	Production			Exports	Imports	
37.7	2.5	([3])	([3])	2.5	3.9	2.6	0.1	0.3	2.6
37.0	2.9	([3])	([3])	2.9	4.7	2.5	.1	.3	2.5
37.2	3.1	([3])	([3])	3.0	4.7	2.4	.1	.2	2.3
36.6	3.4	([3])	0.1	3.3	5.0	2.4	.1	.3	2.1
36.2	3.5	([3])	.3	3.2	5.2	2.6	.2	.3	1.7
37.2	4.4	([3])	.3	4.1	5.8	2.6	.2	.2	1.5
38.1	4.4	([3])	.4	4.0	6.5	2.6	.2	.2	1.3
32.8	4.6	([3])	.5	4.1	6.5	2.4	.2	.2	1.2
33.3	4.9	([3])	.4	4.5	5.8	2.2	.2	.1	1.1
37.1	5.8	([3])	.7	5.1	6.4	2.1	.3	.1	1.0
32.9	5.5	([3])	.5	5.0	7.1	1.9	.3	.1	.9
32.0	5.9	([3])	.5	5.4	6.9	1.7	.6	.1	.9
33.1	6.4	([3])	.6	5.9	7.2	1.5	.7	.1	.8
34.7	7.1	([3])	.6	6.5	7.3	1.7	1.2	.1	.7
36.5	7.7	([3])	.6	7.1	7.8	1.6	1.4	.1	.7
36.7	8.0	([3])	.6	7.4	8.2	1.7	1.5	.1	.6
36.4	8.2	([3])	.7	7.5	8.5	1.7	1.7	.1	.6
34.7	7.9	([3])	.6	7.3	8.2	1.7	2.5	.1	.5
36.5	8.9	([3])	.9	8.0	8.6	1.7	3.2	.1	.5
35.8	8.4	0.1	1.0	7.4	9.0	1.7	3.0	.1	.4
35.5	8.7	.1	1.1	7.7	9.5	1.6	3.5	.2	.4
36.2	10.2	.1	1.3	9.0	9.3	1.6	2.9	.1	.4
36.9	11.3	.1	1.6	9.8	9.2	1.6	3.9	..	.5
37.4	10.9	.2	1.4	9.7	9.8	1.6	4.1	..	.5
33.3	8.8	.3	.9	8.2	10.9	1.5	3.3	.1	.6
31.1	8.7	.4	1.0	8.1	9.1	1.5	3.2	.1	.6
34.5	10.0	.3	1.2	9.2	9.9	1.5	3.9	.1	.7
35.9	10.7	.1	1.2	9.6	9.6	1.5	4.0	.2	[4].8
36.4	11.1	.1	1.3	9.9	9.9	1.6	4.1	.1	[4].9
35.8	10.2	.2	1.1	9.3	10.9	1.6	4.7	.1	[4]1.1

Table 1.30—*Softwood sawtimber consumption, exports, imports,*

(Billion board feet, International ¼-inch log rule)

Year	All products		Industrial sawtimber						
			Total				Lumber		
	Consumption	Production	Consumption	Exports[3]	Imports	Production	Consumption	Exports	Imports
1950	40.5	37.6	39.8	0.4	3.3	36.9	33.1	0.4	3.1
1951	38.9	37.5	38.2	1.0	2.4	36.8	30.8	.9	2.3
1952	39.9	38.1	39.3	.7	2.4	37.6	31.8	.6	2.3
1953	40.0	38.0	39.5	.6	2.6	37.5	31.5	.5	2.5
1954	40.2	37.8	39.9	.7	3.1	37.5	31.5	.6	2.9
1955	42.1	39.6	41.9	.9	3.4	39.4	32.3	.7	3.3
1956	42.9	40.5	42.8	.8	3.2	40.4	32.8	.6	3.2
1957	39.1	37.0	39.0	.7	2.8	36.9	39.2	.6	2.7
1958	39.7	37.3	39.6	.8	3.2	37.2	30.0	.6	3.2
1959	44.1	41.1	44.0	.8	3.8	41.0	33.7	.6	3.8
1960	40.3	37.6	40.2	.9	3.6	37.5	29.6	.7	3.6
1961	40.1	37.1	40.0	1.1	4.1	37.0	29.4	.6	4.0
1962	41.7	38.3	41.6	1.2	4.6	38.2	30.8	.6	4.6
1963	43.5	40.3	43.4	1.8	5.1	40.2	31.8	.7	5.0
1964	46.0	43.2	45.9	2.1	4.9	43.1	33.4	.8	4.9
1965	46.7	44.0	46.6	2.2	4.9	43.9	33.4	.8	4.9
1966	46.3	43.9	46.2	2.5	4.9	43.8	32.7	.9	4.8
1967	44.5	43.0	44.4	3.3	4.8	42.9	31.1	1.0	4.8
1968	48.6	46.9	48.5	4.1	5.8	46.8	34.1	1.0	5.8
1969	47.4	45.5	47.4	4.0	6.0	45.4	33.2	1.0	5.9
1970	48.0	46.7	47.9	4.6	5.9	46.6	32.8	1.1	5.8
1971	52.0	48.5	51.9	3.8	7.3	48.4	35.6	.9	7.2
1972	54.6	50.8	54.5	5.1	8.9	50.7	37.9	1.2	8.9
1973	54.5	51.6	54.4	6.0	8.9	51.5	37.6	1.8	8.9
1974	48.0	46.2	47.9	5.0	6.8	46.1	31.6	1.6	6.7
1975	44.8	44.0	44.7	4.9	5.7	43.9	29.5	1.4	5.6
1976	51.3	49.1	51.2	5.7	7.9	49.0	34.5	1.6	7.8
1977	55.4	50.5	55.2	5.4	10.3	50.3	38.1	1.4	10.1
1978	57.4	51.2	57.2	5.5	11.7	51.0	39.8	1.4	11.6
1979[5]	55.7	51.2	55.5	6.5	11.0	51.0	37.8	1.8	10.9

[1]Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.
[2]Does not include sawtimber used in exported pulp products.
[3]Less than 50 million board feet.
[4]Judgment estimate subject to major revisions.
[5]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; and American Plywood Association.

and production in the United States, by product, 1950–79

(Billion board feet, International ¼-inch log rule)

used for—										
	Plywood and veneer				Pulp products—production and consumption	Miscellaneous products[1]—production and consumption	Logs		Fuelwood—production and consumption
Production	Consumption	Exports	Imports	Production			Exports	Imports	
30.4	1.6	(3)	(3)	1.6	3.6	1.3	(3)	0.2	0.7
29.4	1.8	(3)	(3)	1.8	4.3	1.2	0.1	.1	.7
30.1	1.9	(3)	(3)	1.9	4.3	1.2	.1	.1	.6
29.5	2.2	(3)	(3)	2.2	4.4	1.3	.1	.1	.5
29.2	2.3	(3)	(3)	2.3	4.5	1.4	.1	.2	.3
29.7	3.0	(3)	(3)	3.0	5.0	1.5	.2	.1	.2
30.2	3.0	(3)	(3)	3.0	5.5	1.5	.2	(3)	.1
27.1	3.2	(3)	(3)	3.2	5.1	1.4	.1	.1	.1
27.4	3.6	(3)	(3)	3.6	4.7	1.3	.2	(3)	.1
30.5	4.2	(3)	(3)	4.2	4.9	1.2	.2	(3)	.1
26.7	4.2	(3)	(3)	4.2	5.3	1.1	.2	(3)	.1
26.0	4.5	(3)	(3)	4.5	5.0	1.0	.5	.1	.1
26.8	4.9	(3)	(3)	4.9	5.0	.9	.6	(3)	.1
27.6	5.4	(3)	(3)	5.4	5.1	1.0	1.1	.1	.1
29.3	6.0	(3)	(3)	6.0	5.5	1.0	1.3	(3)	.1
29.3	6.4	(3)	(3)	6.4	5.9	1.0	1.4	(3)	.1
28.8	6.5	(3)	(3)	6.5	6.0	1.0	1.6	.1	.1
27.3	6.4	(3)	(3)	6.4	6.0	1.0	2.3	(3)	.1
29.3	7.2	(3)	(3)	7.2	6.4	1.0	3.1	(3)	.1
28.3	6.6	0.1	(3)	6.7	6.7	1.0	2.9	.1	.1
28.1	6.8	.1	(3)	6.9	7.3	1.0	3.4	.1	.1
29.3	8.1	.1	(3)	8.2	7.1	1.0	2.8	.1	.1
30.2	8.8	.1	(3)	8.9	6.8	1.0	3.8	(3)	.1
30.5	8.7	.2	(3)	8.9	7.1	1.0	4.0	(3)	.1
26.5	7.2	.3	(3)	7.5	8.0	1.0	3.1	.1	.1
25.3	7.2	.4	(3)	7.6	6.9	1.0	3.1	.1	.1
28.3	8.3	.3	(3)	8.6	7.3	1.0	3.8	.1	.1
29.4	8.9	.1	(3)	9.0	7.0	1.0	3.9	.2	[4].2
29.6	9.2	.1	(3)	9.3	7.0	1.1	4.0	.1	[4].2
28.7	8.6	.2	(3)	8.8	7.9	1.1	4.5	.1	[4].2

Table 1.31—*Hardwood sawtimber consumption, exports, imports,*

(Billion board feet, International ¼-inch log rule)

Year	All products		Industrial sawtimber						
			Total				Lumber		
	Consumption	Production	Consumption	Exports[2]	Imports	Production	Consumption	Exports	Imports
1950	12.0	11.7	10.1	0.1	0.4	9.8	7.5	0.1	0.3
1951	12.6	12.2	10.8	.1	.5	10.4	7.8	.1	.3
1952	11.7	11.5	9.9	.2	.3	9.8	7.1	.2	.2
1953	11.8	11.5	10.2	.1	.4	9.9	7.2	.1	.2
1954	11.7	11.2	10.3	.1	.6	9.8	7.1	.1	.2
1955	12.3	11.8	11.0	.2	.7	10.5	7.6	.2	.3
1956	12.9	12.2	11.7	.2	.9	11.0	8.0	.2	.3
1957	10.4	9.8	9.3	.2	.8	8.7	5.7	.2	.2
1958	10.3	9.8	9.3	.2	.7	8.8	5.9	.2	.2
1959	11.7	10.8	10.8	.2	1.1	9.9	6.7	.2	.3
1960	11.1	10.6	10.3	.3	.9	9.7	6.3	.2	.3
1961	10.9	10.4	10.1	.3	.8	9.6	6.0	.2	.2
1962	11.7	10.9	11.0	.2	1.0	10.2	6.5	.1	.3
1963	12.6	11.8	12.0	.2	1.0	11.2	7.3	.1	.3
1964	12.7	11.9	12.1	.2	1.0	11.3	7.4	.1	.3
1965	12.9	12.1	12.4	.2	1.0	11.6	7.6	.1	.3
1966	13.4	12.5	12.9	.3	1.2	12.0	7.8	.2	.4
1967	12.5	11.8	12.1	.3	1.0	11.4	7.5	.2	.3
1968	12.7	11.6	12.3	.2	1.3	11.2	7.4	.1	.3
1969	13.1	11.8	12.8	.2	1.5	11.5	7.8	.1	.4
1970	12.7	11.5	12.4	.2	1.4	11.2	7.5	.1	.3
1971	12.3	10.9	12.0	.3	1.7	10.6	7.1	.2	.4
1972	12.8	11.1	12.4	.3	2.0	10.7	6.9	.2	.4
1973	13.1	11.5	12.7	.3	1.9	11.1	7.2	.2	.5
1974	12.5	11.6	12.0	.4	1.3	11.1	7.0	.2	.4
1975	10.6	9.6	10.1	.3	1.3	9.1	5.9	.2	.3
1976	11.7	10.6	11.1	.3	1.5	10.0	6.3	.2	.3
1977	12.1	10.9	11.5	.3	1.5	10.3	6.6	.2	.3
1978	12.8	11.6	12.1	.5	1.7	10.9	6.8	.4	.4
1979[6]	13.1	12.2	12.2	.6	1.5	11.3	7.1	.4	.4

[1]Includes cooperage logs, poles, piling, fence posts, hewn ties, round mine timbers, box bolts, excelsior bolts, chemical wood, shingle bolts, and other miscellaneous items.
[2]Does not include sawtimber used in exported pulp products.
[3]Less than 50 million board feet.
[4]Judgment estimate subject to major revisions.
[5]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census; the American Paper Institute; the American Pulpwood Association; the National Forest Products Association; and American Plywood Association.

and production in the United States, by product, 1950–79

(Billion board feet, International ¼-inch log rule)

used for——									
	Plywood and veneer				Pulp products—production and consumption	Miscellaneous products[1]—production and consumption	Logs		Fuelwood—production and consumption
Production	Consumption	Exports	Imports	Production			Exports	Imports	
7.3	0.9	[3]	[3]	0.9	0.3	1.3	[3]	0.1	1.9
7.6	1.1	[3]	[3]	1.1	.4	1.3	[3]	.2	1.8
7.1	1.2	[3]	[3]	1.1	.4	1.2	[3]	.1	1.7
7.1	1.2	[3]	0.1	1.1	.6	1.1	[3]	.1	1.6
7.0	1.2	[3]	.3	.9	.7	1.2	[3]	.1	1.4
7.5	1.4	[3]	.3	1.1	.8	1.1	[3]	.2	1.3
7.9	1.4	[3]	.4	1.0	1.0	1.1	[3]	.2	1.2
5.7	1.4	[3]	.5	.9	1.1	1.0	[3]	.2	1.1
5.9	1.3	[3]	.4	.9	1.1	.9	[3]	.1	1.0
6.6	1.6	[3]	.7	.9	1.5	.9	[3]	.1	.9
6.2	1.3	[3]	.5	.8	1.8	.8	0.1	.1	.8
6.0	1.4	[3]	.5	.9	1.9	.7	.1	.1	.8
6.3	1.5	[3]	.6	1.0	2.2	.6	.1	.1	.7
7.1	1.7	[3]	.6	1.1	2.2	.7	.1	.1	.6
7.2	1.7	[3]	.6	1.1	2.3	.6	.1	.1	.6
7.4	1.7	[3]	.6	1.1	2.3	.7	.1	.1	.5
7.6	1.8	[3]	.7	1.1	2.5	.7	.1	.1	.5
7.4	1.6	[3]	.6	1.0	2.2	.7	.1	.1	.4
7.2	1.9	[3]	.9	1.0	2.2	.7	.1	.1	.4
7.5	2.0	[3]	1.1	.9	2.3	.7	.1	.1	.3
7.4	1.9	[3]	1.1	.8	2.2	.7	.1	[3]	.3
6.9	2.1	[3]	1.3	.8	2.2	.6	.1	[3]	.3
6.7	2.5	[3]	1.6	.9	2.4	.6	.1	[3]	.4
6.9	2.2	[3]	1.4	.8	2.7	.6	.1	[3]	.4
6.8	1.6	[3]	.9	.7	2.9	.5	.2	[3]	.5
5.8	1.5	[3]	1.0	.5	2.2	.5	.1	[3]	.5
6.2	1.7	[3]	1.2	.6	2.6	.5	.1	[3]	.6
6.5	1.8	[3]	1.2	.6	2.6	.5	.1	[3]	[4].6
6.8	1.9	[3]	1.3	.6	2.9	.5	.1	[3]	[4].7
7.1	1.6	[3]	1.1	.5	3.0	.5	.2	[3]	[4].9

Appendix 2

Timber Import and Export Statistics of the U.S.

Table 2.1—*Lumber imports into the United States, by softwoods and hardwoods and country of origin, 1950–79*

(Million board feet)

Year	All species[1]				Softwoods				Hardwoods			
	Total	Canada	Mexico	Other	Total[2]	Canada[2]	Mexico	Other	Total	Canada	Mexico	Other
1950	3,423.5	3,102.2	208.0	113.3	3,140.2	2,899.5	191.4	49.3	283.2	202.7	16.6	64.0
1951	2,511.6	2,240.3	135.5	135.8	2,250.0	2,080.2	119.0	50.8	261.6	160.1	16.5	84.9
1952	2,481.6	2,257.7	106.0	117.9	2,266.9	2,139.9	92.1	35.0	214.7	117.9	13.9	82.9
1953	2,759.4	2,541.2	83.8	134.3	2,526.8	2,409.6	73.0	44.2	232.6	131.7	10.9	90.1
1954	3,063.1	2,844.1	80.0	139.0	2,854.6	2,747.7	74.5	32.4	208.5	96.4	5.5	106.6
1955	3,593.0	3,349.7	75.3	168.1	3,326.8	3,225.9	69.7	31.2	266.3	123.8	5.6	136.9
1956	3,404.5	3,168.3	51.6	184.6	3,131.0	3,060.7	47.8	22.5	273.5	107.6	3.8	162.1
1957	2,958.0	2,754.0	53.0	150.9	2,711.9	2,644.7	48.2	19.0	246.1	109.3	4.8	132.0
1958	3,389.6	3,177.8	49.3	162.5	3,154.5	3,088.0	45.1	21.4	235.1	89.7	4.3	141.1
1959	4,063.6	3,785.9	53.1	224.6	3,741.5	3,661.7	49.7	30.2	322.0	124.2	3.4	194.4
1960	3,930.6	3,693.9	41.6	195.1	3,639.3	3,576.1	36.9	26.4	291.2	117.8	4.7	168.7
1961	4,257.9	4,042.6	48.5	166.8	4,013.4	3,943.4	43.7	26.3	244.5	99.2	4.8	140.5
1962	4,892.9	4,637.7	47.8	207.4	4,583.7	4,507.1	40.4	36.2	309.2	130.6	7.4	171.2
1963	5,335.4	5,104.7	28.6	202.0	5,032.0	4,975.6	24.4	32.0	303.3	129.1	4.3	170.0
1964	5,222.6	5,004.1	10.2	208.4	4,917.5	4,872.0	7.0	38.5	305.1	132.0	3.1	169.9
1965	5,232.5	5,016.6	10.1	205.8	4,898.1	4,855.7	8.1	34.3	334.3	160.9	2.0	171.4
1966	5,200.1	4,920.9	5.2	274.0	4,779.2	4,730.4	3.7	45.2	420.8	190.5	1.5	228.8
1967	5,140.7	4,902.5	5.5	232.7	4,798.1	4,747.1	3.1	47.9	342.7	155.4	2.5	184.8
1968	6,154.2	5,899.2	4.0	251.1	5,809.1	5,750.0	3.2	55.9	345.1	149.2	.8	195.1
1969	6,300.6	5,963.4	6.7	330.6	5,854.0	5,784.4	5.8	63.7	446.6	179.0	.8	266.8
1970	6,114.3	5,867.6	7.5	239.3	5,777.7	5,722.5	5.5	49.7	336.7	145.1	2.0	189.6
1971	7,589.4	7,314.5	6.5	268.3	7,231.7	7,172.0	4.9	54.7	357.7	142.5	1.6	213.6
1972	9,433.6	9,029.2	20.5	383.9	8,984.8	8,877.8	18.6	88.4	448.8	151.4	1.9	295.5
1973	9,568.7	8,999.2	20.5	549.0	9,019.9	8,843.9	17.5	158.5	548.7	155.4	2.9	390.4
1974	7,270.8	6,847.3	6.1	417.4	6,821.1	6,732.2	2.4	86.5	449.7	115.1	3.7	330.9
1975	5,975.8	5,738.8	28.5	208.5	5,723.8	5,677.0	.4	46.5	252.0	61.8	28.1	162.1
1976	8,246.8	7,995.3	1.0	250.6	7,958.5	7,912.6	.8	45.1	288.3	82.7	.2	205.4
1977	10,713.2	10,408.0	7.0	298.3	10,369.6	10,327.0	1.2	41.4	343.7	81.0	5.8	256.9
1978	12,214.5	11,879.3	11.9	323.4	11,853.2	11,776.7	11.3	65.3	361.4	102.7	.6	258.1
1979[3]	11,528.5	11,186.5	4.7	337.2	11,150.9	11,098.5	3.1	49.3	377.6	88.0	1.6	287.9

[1]Excludes mixed species (not classified as softwoods or hardwoods) for the years 1950–59.
[2]Includes small volumes of hardwoods for the years 1960–79.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.; National Forest Products Association (formerly the National Lumber Manufacturers Association). *Lumber industry facts 1960–61,* Washington D.C.

Table 2.2—*Woodpulp imports into the United States, by type and region of origin, 1971 and 1977*

(Thousand tons)

Region	Total	Dissolving and special alpha	Sulfite	Sulfate	Soda	Groundwood	All other
1971							
Canada	3,385	250	401	2,533	(1)	179	22
Latin America	3	...	2	1	..	...	..
Western Europe	62	1	5	50	..	(1)	4
Eastern Europe	.....	...	...	.....	..	...	..
Africa	65	64	...	.....	..	(1)	1
Near and Middle East	.....	...	...	.....	..	...	..
Far East	.....	...	...	.....	..	...	..
Other	.....	...	...	.....	..	...	..
Total	3,515	315	408	2,584	(1)	179	28
1977							
Canada	3,685	89	528	2,891	(1)	156	22
Latin America	2	...	(1)	.....	..	1	.
Western Europe	84	...	(1)	60	(1)	...	24
Eastern Europe	.....	...	...	.....	..	...	..
Africa	93	91	...	.....	..	...	2
Near and Middle East	(1)	...	...	(1)	..	...	..
Far East	5	...	...	.....	..	5	..
Other	1	...	(1)	1	(1)	(1)	(1)
Total	3,871	180	528	2,952	1	162	48

[1]Less than 500 tons.

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.

Table 2.3—*Paper and board[1] imports into the United States, by grade and region of origin, 1971 and 1977*

(Thousand tons)

Region	Total paper and board	Paper: Total	Paper: News-print	Paper: Book paper	Paper: Fine paper	Paper: Coarse and industrial paper	Paper: Other paper	Board: Total	Board: Building board	Board: Other board
1971										
Canada	6,955	6,864	6,518	246	1	61	38	91	75	16
Latin America	41	(2)	.....	(2)	..	..	..	41	41	(2)
Western Europe	505	394	317	42	9	25	1	111	108	3
Eastern Europe	6	.....	.....	...	..	..	..	6	6	..
Africa	20	.....	.....	...	..	..	..	20	20	..
Near and Middle East	.....	.....	.....	...	..	..	..	...	...	..
Far East	3	2	.....	2	(2)	(2)	(2)	(2)	(2)	..
Oceania	5	(2)	.....	(2)	(2)	(2)	..	5	5	..
Other	(2)	(2)	.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Total	7,535	7,260	6,835	291	10	86	39	274	255	20
1977										
Canada	7,141	7,051	6,582	304	5	73	87	90	61	29
Latin America	94	6	.....	...	..	..	6	88	88	..
Western Europe	154	122	.....	103	10	9	1	32	30	2
Eastern Europe	55	.....	.....	...	..	..	..	55	55	..
Africa	6	.....	.....	...	..	..	..	6	6	(2)
Near and Middle East	.....	.....	.....	...	..	..	..	..	..	..
Far East	8	(2)	.....	...	(2)	..	..	8	8	..
Oceania	3	1	.....	...	1	..	..	2	2	..
Other	7	2	(2)	(2)	1	(2)	(2)	5	5	(2)
Total	7,468	7,181	6,582	407	17	82	93	287	256	31

[1]Excludes products.
[2]Less than 500 tons.

Note: Data may not add to totals because of rounding. Data are imports for consumption.

Sources: U.S. Department of Commerce, Bureau of the Census. *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.; American Paper Institute. *Statistics of paper and paperboard.* Annual. New York.

Table 2.4—*Pulp product imports into the United States, by product, 1950–79*

(Million cords, roundwood equivalent)

Year	Total	Pulpwood[1]	Woodpulp	Paper and board[2]	Year	Total	Pulpwood[1]	Woodpulp	Paper and board[2]
1950	12.0	1.4	4.3	6.3	1965	15.1	1.3	5.3	8.5
1951	13.2	2.5	4.2	6.5	1966	16.5	1.4	5.7	9.4
1952	12.1	2.1	3.5	6.5	1967	15.9	1.6	5.4	8.9
1953	12.0	1.6	3.9	6.6	1968	16.2	1.4	5.9	8.8
1954	11.8	1.6	3.7	6.5	1969	17.2	1.0	6.8	9.3
1955	12.6	1.8	3.9	6.8	1970	16.4	1.1	6.0	9.2
1956	13.4	1.9	4.1	7.4	1971	16.8	1.2	6.0	9.6
1957	12.3	1.8	3.7	6.9	1972	17.5	1.0	6.3	10.2
1958	11.5	1.4	3.7	6.5	1973	18.7	1.2	6.7	10.8
1959	12.5	1.2	4.3	7.0	1974	18.6	1.0	7.1	10.6
1960	12.7	1.3	4.2	7.2	1975	14.0	.8	5.1	8.1
1961	12.9	1.3	4.3	7.3	1976	16.7	1.1	6.3	9.3
1962	13.6	1.4	4.8	7.3	1977	17.6	1.3	6.5	9.7
1963	13.7	1.6	4.8	7.3	1978	20.2	1.7	6.6	12.0
1964	14.4	1.5	5.0	8.0	1979[3]	20.8	1.4	7.3	12.0

[1]Roundwood and chips.
[2]Includes products.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census, and the American Paper Institute.

Table 2.5—*Hardwood plywood*[1] *imports into the United States, by country of origin, 1950–79*

(Million square feet, surface measure)

Year	Total	Canada	Latin America				Asia						Africa	Europe	Other
			Total	Mexico	Central America and West Indies	South America	Total	Japan	Philippines	Taiwan	Korea	Other Asia			
1950	63.3	50.0	6.3	0.8	(2)	5.5	5.4	5.1	0.3	......	......	....	(2)	1.5	...
1951	70.2	47.2	5.6	.7	0.1	4.8	13.1	12.9	.1	......	......	0.1	0.4	3.8	(2)
1952	85.0	57.1	3.7	.9	.1	2.6	17.6	17.3	.1	0.1	......	(2)	.6	6.0	...
1953	220.4	50.8	8.6	2.1	1.9	4.5	106.3	105.0	.5	.4	......	.4	3.6	51.0	...
1954	434.0	71.1	8.0	3.4	.2	4.4	291.8	289.0	1.5	.1	......	1.1	5.3	51.7	6.2
1955	627.6	99.3	8.9	3.6	1.4	3.9	439.1	428.6	9.8	.1	......	.7	10.9	62.5	6.9
1956	706.5	81.2	5.3	.4	1.0	3.9	543.5	527.2	14.9	.4	......	1.0	13.8	53.4	9.3
1957	846.4	64.4	9.2	1.8	1.9	5.6	717.6	679.8	33.2	3.4	......	1.2	11.0	40.4	3.9
1958	911.4	42.4	11.9	6.0	.6	5.3	794.3	669.6	97.4	23.4	......	3.9	15.6	46.3	.9
1959	1,330.2	60.2	32.1	8.6	4.4	19.1	1,083.0	810.9	213.6	37.3	0.4	20.8	25.8	125.1	4.0
1960	1,014.0	43.0	13.8	2.5	1.8	9.5	857.1	688.3	118.8	45.4	.2	4.4	16.7	83.2	.2
1961	1,097.4	42.1	17.7	1.4	2.5	13.9	962.0	660.5	153.4	108.6	15.9	23.7	14.6	58.6	2.4
1962	1,438.9	56.6	15.6	1.3	.7	13.7	1,269.2	740.1	214.4	212.5	51.4	50.8	13.8	83.7	...
1963	1,620.7	71.9	18.8	1.2	1.2	16.4	1,428.4	739.8	246.7	273.0	120.3	48.6	9.1	92.5	(2)
1964	1,947.2	68.1	13.7	.2	2.2	11.3	1,747.2	680.5	355.7	461.3	205.4	44.4	9.3	108.8	...
1965	2,132.9	64.5	10.9	(2)	(2)	10.8	1,932.3	768.0	307.8	468.2	336.7	51.7	6.8	118.3	...
1966	2,553.8	64.1	8.7	..	...	8.7	2,329.0	783.4	397.9	528.8	573.6	45.2	6.6	145.1	.2
1967	2,532.7	48.0	8.1	(2)	...	8.1	2,355.9	632.3	471.5	485.4	702.0	64.8	2.4	118.2	(2)
1968	3,841.2	53.0	12.1	..	1.0	11.2	3,619.1	921.3	602.2	829.6	1,167.2	98.8	1.0	156.0	(2)
1969	4,290.3	40.6	11.7	.1	4.0	7.6	4,043.9	802.3	572.1	936.0	1,589.8	143.6	1.8	192.3	(2)
1970	4,168.2	24.9	10.2	(2)	1.9	8.3	3,996.3	623.5	570.9	939.6	1,787.3	75.0	.5	136.1	.1
1971	5,176.7	45.8	13.8	..	1.3	12.5	4,989.7	598.3	592.2	1,395.5	2,251.3	152.3	(2)	127.3	.1
1972	6,427.3	69.5	20.4	..	8.7	11.8	6,215.9	519.1	644.2	2,021.9	2,865.6	165.2	.1	121.3	.1
1973	5,146.7	74.4	17.9	..	4.5	13.5	4,959.6	341.0	695.3	1,367.2	2,443.0	113.1	.5	94.0	.2
1974	3,349.0	46.8	18.7	..	1.0	17.8	3,228.9	244.3	279.3	937.2	1,694.7	73.5	...	48.2	6.3
1975	3,906.2	50.4	15.8	..	7.5	8.3	3,805.0	240.5	224.1	1,011.8	2,290.0	38.7	...	30.8	4.3
1976	4,797.9	53.6	18.3	..	6.8	11.5	4,668.8	312.5	352.9	1,189.4	2,785.7	28.2	.5	47.6	9.1
1977	4,590.8	69.3	24.8	..	5.1	19.7	4,445.3	356.1	231.0	1,149.1	2,676.9	32.2	...	44.2	7.1
1978	5,075.9	75.3	29.6	.1	5.9	23.6	4,922.3	255.6	312.4	1,752.8	2,493.0	108.4	.7	48.1	.1
1979[3]	4,216.3	82.2	53.7	(2)	2.4	51.3	4,039.6	192.7	367.3	1,523.1	1,836.7	119.8	(2)	40.8	(2)

[1]Includes mixed species (not classified as hardwoods or softwoods).
[2]Less than 50,000 square feet.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.

Table 2.6—*Hardwood veneer[1] imports into the United States, by country of origin, 1950–79*

(Million square feet, surface measure)

Year	Total	Canada	Latin America				Asia				Africa	Europe	Other
			Total	Mexico	Central America and West Indies	South America	Total	Japan	Philippines	Other Asia			
1950	361.9	348.5	2.3	(2)	2.3	(2)	0.6	0.5	0.1	.....	3.4	7.1	0.1
1951	443.2	396.5	8.2	...	7.7	0.6	2.0	2.0	....	.....	31.8	4.6	.1
1952	428.0	402.5	6.0	0.3	5.7	(2)	.9	.6	.3	.....	15.7	2.9	...
1953	583.5	511.6	1.0	(2)	1.0	(2)	21.3	.3	21.0	(2)	45.0	4.4	.1
1954	584.2	524.1	2.5	2.1	.4	.....	29.0	.3	28.6	0.1	24.2	3.1	1.2
1955	765.4	674.6	6.9	6.1	.8	.....	51.2	.3	49.7	1.2	29.0	2.8	.9
1956	729.1	621.0	7.7	7.3	.4	.....	56.2	3.3	51.4	1.5	37.8	5.3	1.1
1957	502.8	373.7	9.3	4.8	4.4	(2)	77.2	7.4	69.5	.3	37.8	4.7	.1
1958	650.4	455.6	7.4	1.3	5.9	.2	153.4	82.2	70.7	.5	29.5	4.3	.2
1959	1,064.0	559.9	21.1	4.3	6.5	10.3	399.8	225.4	174.1	.3	57.7	25.5	.1
1960	840.8	472.3	22.3	5.2	5.9	11.3	225.2	19.9	205.0	.3	98.1	22.8	.1
1961	894.8	515.9	27.6	5.8	8.8	13.0	237.0	8.6	223.7	4.7	96.0	18.2	.1
1962	1,232.2	638.4	42.7	3.5	16.9	22.3	338.4	5.7	295.6	37.1	168.7	44.0	.1
1963	1,397.9	684.6	63.1	1.7	14.3	47.2	455.2	4.0	391.0	60.1	146.9	48.2	(2)
1964	1,708.3	781.3	69.8	.7	21.8	47.3	664.4	2.1	557.2	105.2	158.8	33.8	.2
1965	1,871.2	852.0	67.2	.1	19.2	47.8	687.0	4.8	527.0	155.2	219.8	44.3	.9
1966	1,843.6	792.8	96.4	.3	21.2	74.9	714.1	3.8	522.7	187.6	209.7	29.6	1.0
1967	1,796.7	755.8	140.9	.1	8.0	132.8	580.9	3.8	451.8	125.3	271.2	27.7	.2
1968	2,178.7	837.7	200.4	1.5	16.8	182.2	837.7	4.3	609.8	223.6	276.5	26.3	.1
1969	1,855.7	713.9	152.7	.6	13.1	139.0	838.6	5.3	671.4	161.9	128.1	22.2	.3
1970	1,605.8	672.4	191.0	.6	5.0	185.4	569.2	3.3	460.0	105.8	147.0	26.1	.2
1971	2,035.2	842.4	216.0	.5	15.1	200.5	809.5	4.5	590.9	214.0	143.1	24.0	.2
1972	2,786.0	1,051.8	303.9	(2)	28.8	275.0	1,226.5	.9	822.5	403.1	153.9	30.2	19.7
1973	2,583.0	944.4	288.4	(2)	43.2	245.2	1,126.2	2.3	850.8	273.0	167.2	27.8	29.0
1974	1,965.9	709.2	243.8	...	43.9	199.9	874.0	.9	660.8	212.3	78.6	39.4	20.8
1975	1,145.5	570.7	132.5	...	22.2	110.3	331.5	3.8	294.3	33.4	74.3	23.1	13.5
1976	1,595.5	804.6	210.8	...	8.3	202.5	520.6	4.5	452.4	63.7	15.0	30.1	14.5
1977	1,718.5	801.4	159.1	.9	13.0	145.2	689.3	5.5	580.5	103.3	19.6	30.5	18.7
1978	1,632.5	817.4	213.0	3.6	21.8	187.7	536.8	7.1	442.6	87.1	19.1	44.7	1.5
1979[3]	1,560.1	834.0	149.3	2.0	28.2	119.2	482.6	1.3	448.2	33.0	35.4	56.4	2.4

[1]Includes mixed species (not classified as hardwoods or softwoods) for the years 1950–59.
[2]Less than 50,000 square feet.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. imports for consumption and general imports: TSUSA commodity by country of origin.* FT 246. Annual.

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Table 2.7—*Lumber exports from the United States, by*

(Million board feet)

Year	All species[1] Total	Canada	Europe[2]	Central and South America[3]	Japan	Other	Total	Canada
1950	517.7	88.6	123.5	145.7	5.8	154.1	406.8	41.7
1951	997.6	134.5	336.5	176.0	18.7	302.0	875.7	71.4
1952	727.3	168.6	171.8	165.3	12.0	209.7	565.7	84.7
1953	643.1	161.2	93.6	144.6	58.2	185.5	512.6	75.8
1954	718.0	161.1	116.3	147.5	16.0	277.2	584.7	86.3
1955	841.0	218.7	145.3	173.3	29.6	274.1	652.4	119.1
1956	761.3	268.6	133.5	164.2	32.9	162.2	570.7	158.9
1957	811.1	237.4	122.8	171.5	47.6	231.8	623.4	138.6
1958	727.2	262.1	105.2	124.3	34.6	201.0	550.1	154.8
1959	787.3	333.6	98.3	120.3	52.9	182.1	607.9	198.5
1960	860.7	252.9	162.9	118.5	56.3	270.1	693.8	144.7
1961	773.1	232.5	152.7	87.4	147.5	153.1	618.2	150.2
1962	759.7	196.9	172.0	103.7	74.1	212.9	628.6	119.3
1963	874.9	186.1	232.0	99.0	114.5	243.4	743.1	107.9
1964	955.6	282.2	243.5	111.7	131.0	187.2	811.5	180.3
1965	919.1	285.1	249.4	118.8	105.7	160.1	778.9	184.0
1966	1,022.6	309.0	250.1	123.8	174.4	165.2	867.9	186.5
1967	1,129.5	338.0	261.0	116.7	265.8	147.9	965.2	207.6
1968	1,161.6	295.4	304.3	110.3	288.5	163.0	1,048.1	210.4
1969	1,142.3	285.0	278.3	109.6	317.2	152.2	1,023.8	198.3
1970	1,243.4	269.9	299.2	123.6	383.5	167.0	1,115.5	202.6
1971	1,093.7	289.3	238.9	100.5	323.1	141.8	933.3	206.3
1972	1,428.3	419.5	286.0	102.8	478.7	141.3	1,191.1	290.1
1973	1,965.9	548.4	517.0	116,1	569.1	215.4	1,752.7	388.5
1974	1,765.4	522.3	347.3	119.2	573.9	202.7	1,566.5	382.2
1975	1,618.1	549.4	244.8	129.6	516.8	177.5	1,405.4	397.5
1976	1,846.0	619.7	354.5	139.8	478.0	254.1	1,605.5	437.9
1977	1,665.6	537.4	336.6	144.9	439.6	207.1	1,427.7	365.5
1978	1,740.9	648.4	347.4	148.6	411.4	185.2	1,353.9	374.4
1979[4]	2,142.4	651.5	456.1	204.6	647.6	182.6	1,781.3	427.6

[1]Excludes mixed species (not classified as softwoods or hardwoods) for the years 1950–59.
[2]Includes the United Kingdom.
[3]Includes Mexico.
[4]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *U.S. exports: schedule B commodity by country.* FT 410. Monthly.; National Forest Products Association (formerly the National Lumber Manufacturers Association). *Lumber industry facts 1960–61.* Washington, D.C.

softwoods and hardwoods and country of destination, 1950–79

(Million board feet)

Softwoods				Hardwoods					
Europe[2]	Central and South America[3]	Japan	Other	Total	Canada	Europe[2]	Central and South America[3]	Japan	Other
83.1	136.8	5.7	139.4	110.9	46.9	40.4	8.9	0.1	14.7
324.2	164.6	18.7	296.8	121.9	63.1	42.2	11.3	...	5.2
109.4	155.3	11.9	204.2	161.6	83.8	62.3	10.0	...	5.5
71.2	136.8	58.0	170.8	130.5	85.5	22.3	7.8	.2	14.7
97.4	139.3	15.9	245.9	133.3	74.9	18.9	8.2	.1	31.3
95.8	147.6	29.5	260.4	188.6	99.6	49.5	25.7	.2	13.7
85.8	136.6	32.8	156.6	190.5	109.7	47.6	27.5	.1	5.7
88.1	148.8	47.4	200.4	187.7	98.8	34.7	22.7	.1	31.4
64.5	113.2	34.4	183.2	177.1	107.3	40.7	11.1	.2	17.8
80.5	104.2	52.6	172.2	179.4	135.1	17.9	16.2	.3	9.9
134.6	101.2	55.7	257.7	166.9	108.2	28.4	17.4	.5	12.4
108.4	80.3	146.8	132.5	154.9	82.3	44.3	7.0	.6	20.7
142.3	95.6	73.5	197.9	131.1	77.6	29.7	8.1	.6	15.1
198.9	92.0	112.5	231.7	131.8	78.1	33.1	6.9	2.0	11.7
214.5	103.9	128.5	184.4	144.1	101.9	29.0	7.8	2.5	2.9
229.3	104.8	103.1	157.7	140.2	101.1	20.1	14.0	2.6	2.4
230.3	118.3	171.3	161.5	154.7	122.5	19.9	5.5	3.1	3.7
241.0	112.5	260.7	143.5	164.3	130.4	20.0	4.3	5.1	4.5
288.9	105.3	284.8	158.6	113.5	85.0	15.4	5.0	3.8	4.4
264.6	102.5	309.6	148.9	118.4	86.7	13.7	7.1	7.7	3.3
281.8	109.4	359.6	162.2	127.9	67.3	17.5	14.3	23.9	4.9
213.8	87.6	287.4	138.2	160.3	83.0	25.2	12.9	35.7	3.6
267.9	89.1	407.2	136.9	237.2	129.4	18.1	13.7	71.5	4.4
488.3	99.9	564.4	211.6	213.2	159.9	28.7	16.2	4.7	3.8
311.3	104.3	570.5	198.3	198.9	140.1	36.1	14.9	3.4	4.4
218.7	109.0	515.3	165.0	212.7	151.9	26.2	20.7	1.5	12.5
316.3	130.2	475.1	246.0	240.5	181.8	38.2	9.5	2.9	8.1
288.6	138.2	436.7	198.6	237.9	171.9	48.0	6.7	2.9	8.4
257.6	132.4	407.6	181.9	387.0	274.0	89.8	16.1	3.7	3.3
345.6	190.5	640.5	177.0	361.1	223.9	110.5	14.1	7.1	5.6

Table 2.8—*Woodpulp exports from the United States, by type and region of destination, 1971 and 1977*

(Thousand tons)

1971

Region	Total	Dissolving and special alpha	Sulfite	Sulfate	All other
Canada	72	17	6	49	1
Latin America	277	106	27	144	1
Western Europe	1,079	345	74	659	1
Eastern Europe	82	70	(1)	12	..
Africa	46	(1)	2	45	..
Near and Middle East	27	5	5	17	..
Far East	530	241	79	203	7
Oceania	60	6	20	35	..
Other	1	(1)	(1)	(1)	(1)
Total	2,175	790	213	1,164	9

1977

Region	Total	Dissolving and special alpha	Sulfite	Sulfate	All other
Canada	96	7	18	55	15
Latin America	308	83	36	186	2
Western Europe	1,278	294	71	851	61
Eastern Europe	83	59	2	22	..
Africa	138	21	1	116	..
Near and Middle East	17	2	1	13	..
Far East	691	328	61	302	(1)
Oceania	26	(1)	10	15	1
Other	5	1	1	2	1
Total	2,640	796	201	1,562	81

[1]Less than 500 tons.

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. exports: schedule B commodity by country.* FT 410. Monthly.

Table 2.9—*Paper and board*[1] *exports from the United States, by grade and region of destination, 1971 and 1977*

(Thousand tons)

Region	Total paper and board	Paper: Total	Paper: Newsprint	Paper: Book paper	Paper: Fine paper	Paper: Coarse and industrial paper	Paper: Other paper	Board: Total	Board: Building board	Board: Other board
1971										
Canada	307	121	2	26	36	48	10	186	33	153
Latin America	700	166	73	29	13	41	10	533	3	530
Western Europe	1,323	90	7	31	21	28	2	1,233	11	1,222
Eastern Europe	24	(2)	...	..	(2)	(2)	(2)	24	(2)	24
Africa	153	25	(2)	3	3	18	1	128	2	126
Near and Middle East	117	11	...	1	1	9	1	106	1	106
Far East	303	127	81	4	24	17	1	176	1	175
Oceania	60	16	2	3	4	5	2	44	(2)	44
Other	8	5	(2)	1	1	2	1	3	1	2
Total	2,995	562	166	97	102	169	28	2,434	52	2,381
1977										
Canada	556	280	3	79	89	89	20	276	65	210
Latin America	822	238	91	60	19	61	7	584	11	573
Western Europe	836	99	17	13	31	38	(2)	737	8	728
Eastern Europe	2	1	...	(2)	(2)	1	..	(2)	..	(2)
Africa	167	12	1	3	3	5	..	155	(2)	155
Near and Middle East	141	14	...	1	1	10	1	128	5	123
Far East	297	37	14	5	4	14	1	260	(2)	260
Oceania	106	37	1	17	8	11	(2)	69	1	68
Other	27	14	1	2	3	6	3	12	3	9
Total	2,953	732	129	180	156	235	32	2,221	93	2,127

[1]Excludes products.
[2]Less than 500 tons.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Commerce, Bureau of the Census. *U.S. exports: schedule B commodity by country.* FT 410. Monthly; American Paper Institute. *Statistics of paper and paperboard.* Annual. New York.

Table 2.10—*Pulp product exports from the United States, by product, 1950–79*

(Million cords, roundwood equivalent)

Year	Total	Pulpwood[1]	Woodpulp	Paper and board[2]	Year	Total	Pulpwood[1]	Woodpulp	Paper and board[2]
1950	0.7	([3])	0.2	0.4	1965	5.0	0.2	2.7	2.2
1951	1.2	([3])	.4	.8	1966	5.6	.3	2.9	2.4
1952	1.1	([3])	.4	.7	1967	6.5	.6	3.3	2.6
1953	.9	([3])	.3	.6	1968	7.9	1.2	3.5	3.2
1954	1.7	([3])	.9	.8	1969	9.0	1.7	3.9	3.4
1955	2.3	.1	1.2	1.0	1970	11.2	2.0	5.7	3.5
1956	2.1	.1	1.0	.9	1971	9.4	1.5	4.0	3.9
1957	2.4	.1	1.2	1.1	1972	10.0	2.0	4.1	3.9
1958	2.1	.1	1.0	1.0	1973	10.8	2.7	4.3	3.8
1959	2.5	.1	1.3	1.1	1974	13.2	3.1	5.3	4.8
1960	3.6	.2	2.2	1.2	1975	11.5	2.6	4.9	4.0
1961	3.9	.2	2.2	1.4	1976	12.1	3.3	4.4	4.4
1962	3.8	.1	2.3	1.4	1977	12.3	3.4	4.8	4.1
1963	4.4	.1	2.7	1.6	1978	11.9	3.1	4.6	4.2
1964	5.1	.1	3.0	2.1	1979[4]	13.7	3.8	5.3	4.6

[1]Roundwood and chips.
[2]Includes products.
[3]Less than 50,000 cords.
[4]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census, and the American Paper Institute.

Table 2.11—*Log exports from the United States, by species, 1950–79*

(Million board feet, log scale)

Year	Total	Softwoods				Hardwoods		
		Total	Douglas-fir	Port-Orford cedar	Other	Total	Walnut	Other
1950......	48.2	28.9	1.0	0.3	27.6	19.3	1.0	18.3
1951......	79.4	57.9	2.4	.6	54.9	21.5	1.0	20.5
1952......	63.7	44.4	4.2	1.9	38.3	19.2	.3	18.9
1953......	115.1	86.0	12.4	3.5	70.0	29.2	.5	28.6
1954......	139.5	106.4	12.8	13.8	79.8	33.1	.6	32.5
1955......	166.2	144.2	9.8	10.7	123.7	22.0	1.2	20.8
1956......	187.7	154.9	15.8	13.9	125.2	32.8	1.1	31.6
1957......	139.3	107.3	8.1	22.8	76.4	32.0	1.4	30.6
1958......	169.8	127.3	12.4	32.3	82.7	42.5	2.3	40.2
1959......	204.6	167.6	20.8	39.2	107.7	37.0	3.7	33.2
1960......	266.3	210.3	27.5	37.2	145.6	56.0	10.2	45.9
1961......	481.8	432.2	66.8	61.2	304.2	49.5	7.2	42.4
1962......	522.2	452.7	48.1	41.5	363.1	69.5	10.3	59.2
1963......	951.3	879.6	71.6	63.9	744.1	71.8	16.5	55.3
1964......	1,086.3	1,022.6	94.6	37.0	891.0	63.7	11.1	52.6
1965......	1,192.8	1,111.4	111.3	39.1	961.0	81.4	23.6	57.9
1966......	1,393.1	1,317.5	130.5	43.0	1,144.0	75.6	12.8	62.8
1967......	1,970.7	1,873.6	272.0	34.6	1,567.0	97.1	16.4	80.7
1968......	2,568.1	2,473.2	396.5	38.4	2,038.3	94.9	21.9	73.0
1969......	2,397.0	2,316.8	380.6	40.7	1,895.6	80.2	20.6	59.5
1970......	2,740.9	2,672.0	487.0	54.1	2,130.9	68.9	17.4	51.5
1971......	2,288.8	2,229.8	444.5	40.2	1,745.1	59.0	12.9	46.2
1972......	3,141.4	3,047.5	766.5	46.1	2,234.9	93.9	15.5	78.4
1973......	3,366.1	3,252.2	973.0	29.7	2,249.4	113.9	15.7	98.2
1974......	2,642.4	2,523.7	752.7	35.6	1,735.4	118.7	7.8	110.8
1975......	2,666.9	2,600.6	820.4	38.7	1,741.5	66.3	8.5	57.8
1976......	3,249.9	3,155.7	1,022.4	38.4	2,094.9	94.3	7.4	86.9
1977......	3,069.6	2,980.0	1,007.2	20.7	1,952.1	89.7	7.6	82.0
1978......	3,409.2	3,298.4	1,192.2	29.2	2,077.0	110.8	8.8	102.0
1979[1].....	3,897.0	3,768.2	1,351.0	24.6	2,392.6	128.8	6.8	122.0

[1]Preliminary.

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. exports: schedule B commodity by country.* FT 410. Monthly.

Table 2.12—*Log exports from the United States, by region of destination, 1950–79*

(Million board feet, log scale)

Year	Total	Canada	Western Europe	Japan	Other	Year	Total	Canada	Western Europe	Japan	Other
1950......	48.2	42.5	3.6	.....	2.1	1965......	1,192.8	352.9	29.4	804.4	6.2
1951......	79.4	71.8	4.7	1.4	1.6	1966......	1,393.1	266.2	17.3	1,083.0	26.5
1952......	63.7	53.8	3.0	6.5	.4	1967......	1,970.7	335.8	20.8	1,583.6	30.6
1953......	115.1	69.2	3.8	41.6	.6	1968......	2,568.1	341.8	28.8	2,119.2	78.4
1954......	139.5	75.4	4.8	54.5	4.7	1969......	2,397.0	324.6	29.9	2,007.8	34.8
1955......	166.2	138.4	8.9	18.0	.8	1970......	2,740.9	291.8	23.1	2,366.1	59.9
1956......	187.7	160.2	5.7	20.5	1.2	1971......	2,283.8	339.9	20.5	1,847.1	81.2
1957......	139.3	97.1	5.3	36.0	1.0	1972......	3,141.4	519.1	31.9	2,528.0	62.4
1958......	169.8	112.6	7.7	47.9	1.6	1973......	3,366.1	417.8	41.5	2,779.5	127.3
1959......	204.6	126.6	7.2	70.1	.7	1974......	2,642.4	332.3	39.1	2,114.2	156.7
1960......	266.3	150.7	15.9	98.6	1.1	1975......	2,666.9	277.6	35.3	2,256.4	97.6
1961......	481.8	99.6	16.3	364.8	1.1	1976......	3,249.9	362.5	48.6	2,675.1	163.7
1962......	522.2	167.3	24.8	329.0	1.2	1977......	3,069.6	350.0	46.0	2,460.1	213.6
1963......	951.3	209.3	32.2	691.1	18.8	1978......	3,409.2	368.5	57.5	2,646.1	337.3
1964......	1,086.3	288.5	19.0	755.4	23.4	1979[1].....	3,897.0	407.6	65.6	3,149.1	274.7

[1]Preliminary.

Note: Data may not add to totals because of rounding.

Source: U.S. Department of Commerce, Bureau of the Census. *U.S. exports: schedule B commodity by country.* FT 410. Monthly.

Table 2.13—*Timber product imports and exports*

(Million cubic feet, roundwood equivalent)

Year	Total				Lumber			Plywood
			Net imports					
	Imports	Exports	Volume	Percent of U.S. consumption	Imports	Exports	Net imports	Imports
1940	715	290	425	3.8	115	150	−35	(²)
1941	865	220	645	5.2	210	110	100	(²)
1942	880	175	705	6.0	240	70	170	(²)
1943	715	150	565	5.2	135	50	85	(²)
1944	695	135	560	5.1	155	55	100	(²)
1945	835	150	685	6.7	165	70	95	(²)
1946	970	155	815	7.3	195	100	95	(²)
1947	1,115	300	815	7.0	205	210	−5	(²)
1948	1,260	165	1,095	9.0	295	100	195	(²)
1949	1,105	170	935	8.4	245	105	140	(²)
1950	1,525	140	1,385	11.4	535	80	455	5
1951	1,465	260	1,205	9.9	390	155	235	10
1952	1,375	215	1,160	9.7	385	115	275	10
1953	1,425	190	1,235	10.3	430	100	330	15
1954	1,465	270	1,195	10.1	480	110	365	30
1955	1,610	340	1,275	10.4	560	130	430	40
1956	1,640	315	1,330	10.6	530	120	410	45
1957	1,495	340	1,155	10.2	460	130	335	45
1958	1,495	310	1,185	10.6	530	115	415	50
1959	1,700	355	1,345	11.1	635	120	515	75
1960	1,680	455	1,225	10.7	610	135	480	60
1961	1,745	500	1,245	11.1	665	120	545	60
1962	1,910	505	1,410	12.2	760	120	645	75
1963	1,990	640	1,350	11.3	830	135	695	80
1964	2,035	735	1,300	10.4	815	150	665	90
1965	2,105	740	1,365	10.6	815	145	670	100
1966	2,230	835	1,395	10.8	810	160	650	115
1967	2,165	1,020	1,145	9.3	800	175	625	110
1968	2,400	1,235	1,165	9.0	960	180	780	165
1969	2,515	1,295	1,215	9.4	980	180	805	180
1970	2,430	1,540	890	7.1	955	195	760	170
1971	2,670	1,295	1,375	10.7	1,130	165	970	210
1972	3,060	1,545	1,520	11.3	1,415	215	1,200	270
1973	3,150	1,755	1,395	10.1	1,460	300	1,160	225
1974	2,755	1,805	950	7.3	1,115	270	845	155
1975	2,220	1,685	530	4.5	930	255	675	170
1976	2,840	1,870	970	7.2	1,290	290	1,000	215
1977	3,310	1,795	1,515	10.7	1,675	260	1,410	210
1978	3,755	1,845	1,910	12.9	1,910	275	1,635	230
1979[3]	3,660	2,135	1,530	10.3	1,800	340	1,465	195

for the United States, by product, 1940–79

(Million cubic feet, roundwood equivalent)

and veneer		Pulp products[1]			Logs			
Exports	Net imports	Imports	Exports	Net imports	Imports	Exports	Net exports	Pulpwood chip exports
5	−5	565	125	440	35	10	−25	...
5	−5	600	100	500	55	5	−50	...
5	−5	610	95	515	30	5	−25	...
15	−15	560	80	480	20	5	−15	...
10	−10	515	65	450	25	5	−20	...
10	−10	645	65	580	25	5	−20	...
5	−5	750	50	700	25	([2])	−25	...
10	−10	880	70	810	30	10	−20	...
([2])	([2])	920	55	865	45	10	−35	...
([2])	([2])	830	55	775	30	10	−20	...
([2])	5	935	50	885	50	10	−40	...
([2])	10	1,025	90	940	40	15	−25	...
([2])	10	945	85	860	35	10	−25	...
([2])	15	935	70	865	40	20	−20	...
([2])	30	920	135	785	40	25	−15	...
([2])	35	975	175	800	35	30	−10	...
([2])	40	1,040	160	880	30	35	([2])	...
([2])	45	960	185	775	25	25	([2])	...
([2])	50	895	165	730	20	30	10	...
5	70	970	195	775	20	35	15	...
([2])	60	985	275	710	20	45	25	...
([2])	60	1,000	295	705	20	85	65	...
([2])	75	1,055	295	760	20	90	70	...
5	80	1,060	340	720	20	165	145	...
5	85	1,120	395	725	10	185	175	...
5	95	1,175	380	795	15	205	190	5
5	110	1,290	420	870	20	240	220	15
10	100	1,240	460	780	15	335	320	40
10	155	1,260	525	735	15	440	420	85
20	160	1,340	570	770	15	410	395	120
15	155	1,280	720	560	25	465	440	145
15	195	1,310	620	695	15	390	375	110
25	245	1,365	625	740	10	535	530	140
40	190	1,460	640	820	5	575	570	200
50	105	1,470	805	665	15	455	440	230
70	100	1,105	715	390	15	455	440	195
65	145	1,320	710	610	15	555	540	245
35	175	1,395	725	670	30	525	495	250
45	185	1,595	720	875	20	585	565	225
45	150	1,640	805	835	25	665	640	280

[1]Includes both pulpwood and the pulpwood equivalent of woodpulp, paper and board, and paper and board products.
[2]Less than 2.5 million cubic feet.
[3]Preliminary.

Note: Data may not add to totals because of rounding.

Sources: U.S. Department of Agriculture, Forest Service. Derived from data published by the U.S. Department of Commerce, Bureau of the Census, and the American Paper Institute.

Appendix 3
Forest Statistics of the U.S.

Appendix 3. Forest Statistics of the U.S.

All data in this report are derived from information collected in periodic surveys of the forest resources of each State. These surveys are carried out by the Forest Resources Evaluation Research units at the Forest and Range Experiment Stations under the authority of Section 3 (b) of the Forest and Rangeland Renewable Resources Research Act of 1978 (P.L. 95–307 June 30, 1978). The dates of the field work and inventory for the latest survey in each State are shown in table 70 of this Appendix. Since the surveys are periodic, it was necessary to update the survey information for most States to the common year—1976 for growth, removal, mortality, and output data, 1977 for area and inventory volume—used in this report.

The following summarizes the procedures used in updating and compiling the basic data collected in these surveys to the common year.

Forest inventories were updated by adding estimates of growth and deducting estimates of removals and mortality. Data on growth and mortality were derived from the survey data by species and owner group. Removals were estimated from data on timber product harvests, logging residues and unsalvaged timber originating from land clearing or other kinds of land use change. Because information sources and forest conditions differ, the updating procedures used were slightly different in the various sections of the country.

In all sections, growth and mortality estimates were developed using TRAS [1] (Timber Resource Analysis System), a computer program that calculates growth by 2-inch diameter classes. Updates were performed separately for softwoods and hardwoods and for various owner groups depending on the availability of removals data. Forest areas were updated separately by State based on recent trends in land use change.

In the eastern United States, the updates were done for all owners combined and the new inventory data distributed to ownership classes based on the proportion of volume each contained at the year of inventory. For the Pacific Coast and Alaska, removals estimates were developed for each owner group and the updates were conducted separately. The updates were conducted by half-State geographic regions for Oregon, Washington, and Alaska. Inventories for the Rocky Mountains were also updated by ownership.

When necessary, data for 1952, 1962, and 1970 were revised to be comparable with the most recent inventory information. Some data are, therefore, not the same as the data originally published in Timber Resources for America's Future,[2] Timber Trends in the United States,[3] and The Outlook for Timber in the United States.[4]

Sampling errors for volume and area data are similar to those published in the periodic reports on the forest resources of each State. The State surveys are designed to provide sampling errors no greater than 3 percent per million acres of commercial forest land, 5 percent per billion cubic feet of growing stock in the East and 10 percent per billion cubic feet in the West. However, because of cooperative assistance contributed by forest industries, State forestry agencies, and other public agencies, sampling errors actually achieved as shown in table 70 are often much lower than the maximum allowable.

More detailed information (than given in this Appendix) on the forest resources of individual States can be obtained from the Forest Resources Evaluation Research units at the Forest and Range Experiment Stations listed below:

Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, South Dakota (west of 103 meridian), Utah and Wyoming

Intermountain Forest and Range Experiment Station
Forest Service Building
507—25th Street
Ogden, UT 84401

Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota (east of 103 meridian) and Wisconsin

North Central Forest Experiment Station
1992 Folwell Avenue
St. Paul, MN 55108

Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont and West Virginia

Northeastern Forest Experiment Station
370 Reed Road
Broomall, PA 19008

California, Hawaii, Oregon, and Washington

Pacific Northwest Forest and Range Experiment Station
809 NE Sixth Avenue
Portland, OR 97232

Alaska

PNW—Anchorage
Forest Sciences Laboratory
2221 E. Northern Lights Blvd.
Anchorage, AK 99504

Florida, Georgia, North Carolina, South Carolina, Virginia

Southeastern Forest Experiment Station
Post Office Building
P.O. Box 2570
Asheville, NC 28802

Alabama, Arkansas, Louisiana, Mississippi, Oklahoma, Tennessee, Texas

Southern Forest Experiment Station
U.S. Postal Service Building
701 Loyola Avenue
New Orleans, LA 70013

[1] Larsen, Robert W., and Marcus H. Goforth. TRAS—A computer program for the projection of timber volume. U.S. Dept. Agric., Agric. Handb. 377, Govt. Print. Off., Washington, D.C., 24 p. June 1970.

[2] U.S. Department of Agriculture, Forest Service. Timber resources for America's future. Forest Res. Rep. 14, Govt. Print. Off., Washington, D.C., 713 p. January 1958.

[3] U.S. Department of Agriculture, Forest Service. Timber trends in the United States. Forest Res. Rep. 17, Govt. Print. Off., Washington, D.C., 235 p. February 1965.

[4] U.S. Department of Agriculture, Forest Service. The outlook for timber in the United States. Forest Res. Rep. 20, Govt. Print. Off., Washington, D.C., 367 p. 1973.

Table 3.1—*Land areas in the United States, by major class of land, section, region, and State, January 1, 1977*[1]

[Thousand acres]

Section, region and State	Total land area[2]	Forest land: Total	Forest land: Commercial	Forest land: Productive reserved	Forest land: Productive deferred	Forest land: Other forest	Range land	Other land[3]
New England:								
Connecticut	3,081.7	1,860.8	1,805.6	30.5	.0	24.7	.0	1,220.9
Maine	19,729.2	17,718.3	16,864.0	220.7	.0	633.6	.4	2,010.5
Massachusetts	5,006.6	2,952.3	2,797.7	104.5	.0	50.1	.1	2,054.2
New Hampshire	5,731.3	5,013.5	4,692.0	58.7	25.0	237.8	.0	717.8
Rhode Island	664.4	404.2	395.3	8.9	.0	.0	.0	260.2
Vermont	5,906.9	4,511.7	4,429.9	61.5	.0	20.3	.2	1,395.0
Total	40,120.1	32,460.8	30,984.5	484.8	25.0	966.5	.7	7,658.6
Middle Atlantic:								
Delaware	1,232.5	391.8	384.4	1.8	.0	5.6	.0	840.7
Maryland	6,289.2	2,653.2	2,522.7	108.9	.0	21.6	83.7	3,552.3
New Jersey	4,775.4	1,928.4	1,856.8	34.0	.0	37.6	60.5	2,786.5
New York	30,356.6	17,218.4	14,243.3	2,567.3	.0	407.8	1.8	13,136.4
Pennsylvania	28,592.2	16,825.9	15,923.7	532.0	.0	370.2	.1	11,766.2
West Virginia	15,334.8	11,668.6	11,483.7	124.4	36.0	24.5	.0	3,666.2
Total	86,580.7	50,686.3	46,414.6	3,368.4	36.0	867.3	146.1	35,748.3
Lake States:								
Michigan	36,172.5	19,270.4	18,778.2	268.2	19.0	205.0	.4	16,901.7
Minnesota	50,382.0	16,709.2	13,695.1	1,175.6	3.0	1,835.5	155.8	33,517.0
North Dakota	43,938.7	421.8	405.0	3.2	.0	13.6	12,295.9	31,221.0
South Dakota (East)	41,502.4	334.7	223.0	.0	.0	111.7	18,745.3	22,422.4
Wisconsin	34,616.0	14,907.7	14,478.0	34.2	14.0	381.5	7.0	19,701.3
Total	206,611.6	51,643.8	47,579.3	1,481.2	36.0	2,547.3	31,204.4	123,763.4
Central:								
Illinois	35,441.7	3,810.4	3,692.3	44.9	8.2	65.0	.3	31,631.0
Indiana	22,951.1	3,942.9	3,815.0	38.5	9.0	80.4	3.1	19,005.1
Iowa	35,634.2	1,561.3	1,460.2	75.9	.0	25.2	38.4	34,034.5
Kansas	52,126.7	1,344.4	1,187.0	.0	.0	157.4	16,278.2	34,504.1
Kentucky	25,282.0	12,160.8	11,901.9	212.8	.0	46.1	.0	13,121.2
Missouri	43,867.8	12,876.0	12,288.6	256.1	33.0	298.3	1,447.6	29,544.2
Nebraska	48,828.1	1,029.1	788.8	13.8	.0	226.5	24,274.4	23,524.6
Ohio	26,121.0	6,146.6	6,028.8	102.4	6.0	9.4	.0	19,974.4
Total	290,252.6	42,871.5	41,162.6	744.4	56.2	908.3	42,042.0	205,339.1
Total, North	623,565.0	177,662.4	166,141.0	6,078.8	153.2	5,289.4	73,393.2	372,509.4
South Atlantic:								
North Carolina	30,955.7	20,043.3	19,562.2	433.8	1.1	46.2	.0	10,912.4
South Carolina	19,143.0	12,249.4	12,176.1	59.2	1.5	12.6	20.0	6,873.6
Virginia	25,286.2	16,417.4	15,938.8	374.6	34.0	70.0	27.5	8,841.3
Total	75,384.9	48,710.1	47,677.1	867.6	36.6	128.8	47.5	26,627.3
East Gulf:								
Florida	33,993.6	17,039.7	15,330.0	114.5	1.1	1,594.1	2,189.1	14,764.8
Georgia	36,795.7	25,256.0	24,812.3	413.5	.0	30.2	.0	11,539.7
Total	70,789.3	42,295.7	40,142.3	528.0	1.1	1,624.3	2,189.1	26,304.5
Central Gulf:								
Alabama	32,231.1	21,361.1	21,333.1	28.0	.0	.0	54.0	10,816.0
Mississippi	29,929.7	16,715.6	16,504.3	211.3	.0	.0	19.7	13,194.4
Tennessee	26,289.9	13,160.5	12,819.8	322.2	18.5	.0	400.4	12,729.0
Total	88,450.7	51,237.2	50,657.2	561.5	18.5	.0	474.1	36,739.4
West Gulf:								
Arkansas	33,090.8	18,281.5	18,206.7	39.1	13.3	22.4	.2	14,809.1
Louisiana	28,409.2	14,558.1	14,526.6	18.3	13.2	.0	516.6	13,334.5
Oklahoma	43,727.8	8,513.3	4,323.4	32.4	.0	4,157.5	9,300.9	25,913.6
Texas	167,282.8	23,279.3	12,512.5	14.9	18.1	10,733.8	91,598.8	52,404.7
Total	272,510.6	64,632.2	49,569.2	104.7	44.6	14,913.7	101,416.5	106,461.9
Total, South	507,135.5	206,875.2	188,045.8	2,061.8	100.8	16,666.8	104,127.2	196,133.1

See footnotes at end of table.

Table 3.1—*Land areas in the United States, by major class of land, section, region, and State, January 1, 1977*[1]—*Cont'd.*

[Thousand acres]

Section, region and State		Total land area[2]	Forest land: Total	Commercial	Productive reserved	Productive deferred	Other forest	Range land	Other land[3]
Pacific Northwest:									
Alaska—	Coastal	32,895.0	13,340.9	7,040.2	193.3	318.8	5,788.6	16,550.5	3,003.6
	Interior	329,590.0	105,804.0	[4]4,109.9	.0	.0	[4]101,694.1	214,921.1	8,864.9
	Summary	362,485.0	119,144.9	11,150.1	193.3	318.8	107,482.7	231,471.6	11,868.5
Oregon—	Western	18,965.0	15,154.0	13,651.0	304.0	109.0	1,090.0	2,009.0	1,802.0
	Eastern	42,391.0	14,656.0	10,560.0	413.0	175.0	3,508.0	20,313.7	7,421.3
	Summary	61,356.0	29,810.0	24,211.0	717.0	284.0	4,598.0	22,322.7	9,223.3
Washington—	Western	15,694.0	12,607.0	9,788.0	1,024.0	150.0	1,645.0	658.8	2,428.2
	Eastern	26,762.0	10,574.0	8,134.0	720.0	168.0	1,552.0	7,236.2	8,951.8
	Summary	42,456.0	23,181.0	17,922.0	1,744.0	318.0	3,197.0	7,895.0	11,380.0
Total		466,297.0	172,135.9	53,283.1	2,654.3	920.8	115,277.7	261,689.3	32,471.8
Pacific Southwest:									
California		99,847.0	40,152.0	16,303.0	1,365.0	268.0	22,216.0	43,039.7	16,655.3
Hawaii		4,109.0	1,986.0	948.0	114.0	.0	924.0	968.0	1,155.0
Total		103,956.0	42,138.0	17,251.0	1,479.0	268.0	23,140.0	44,007.7	17,810.3
Total, Pacific Coast		570,253.0	214,273.9	70,534.1	4,133.3	1,188.8	138,417.7	305,697.0	50,282.1
Northern Rocky Mtn.:									
Idaho		52,676.1	21,726.6	13,540.6	1,913.0	935.3	5,337.7	23,598.1	7,351.4
Montana		92,896.2	22,559.3	14,359.4	2,001.8	708.7	5,489.4	53,334.0	17,002.9
South Dakota (West)		6,878.8	1,367.3	1,244.1	11.1	.0	112.1	4,652.4	859.1
Wyoming		62,055.3	10,028.3	4,334.2	2,688.6	331.3	2,674.2	46,896.2	5,130.8
Total		214,506.4	55,681.5	33,478.3	6,614.5	1,975.3	13,613.4	128,480.7	30,344.2
Southern Rocky Mtn.:									
Arizona		72,580.3	18,493.9	3,895.6	382.8	19.1	14,196.4	45,168.3	8,918.1
Colorado		66,283.1	22,271.0	11,314.7	684.0	752.2	9,520.1	27,821.7	16,190.4
Nevada		70,294.8	7,683.3	134.3	5.9	.0	7,543.1	56,887.7	5,723.8
New Mexico		77,669.0	18,059.8	5,537.5	550.5	279.5	11,692.3	48,725.5	10,883.7
Utah		52,504.7	15,557.4	3,404.6	152.6	157.3	11,842.9	29,701.0	7,246.3
Total		339,331.9	82,065.4	24,286.7	1,775.8	1,208.1	54,794.8	208,304.2	48,962.3
Total, Rocky Mountain		553,838.3	137,746.9	57,765.0	8,390.3	3,183.4	68,408.2	336,784.9	79,306.5
Total, all regions		2,254,791.8	736,558.4	482,485.9	20,664.2	4,626.2	228,782.1	820,002.3	698,231.1

[1]Zeros indicate no data or negligible amounts.

[2]U.S. Department of Commerce, Bureau of Census. *Area measurement reports*, GE-20 No. 1, 22 p. 1970, updated to account for changes in inland water estimates obtained from the USDA, Soil Conservation Service's National Resource Inventory, 1977.

[3]Includes pasture, cropland, industrial and urban area and other nonforest land.

[4]The commercial forest land area estimate is very conservative for Interior Alaska because the detailed survey is only partially completed.

Table 3.2—*Area of productive reserved, productive deferred, and other forest land in the eastern United States, by forest type, section, region, and State, January 1, 1977*

[Thousand acres]

Section, region and State	Total	Forest type: Commercial: White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Nonstocked	Noncommercial
New England:													
Connecticut													
Productive reserved	30.5	2.0	15.2	.0	.2	.5	8.0	.0	2.8	1.8	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	24.7	.0	1.8	.0	.0	.0	1.8	.0	21.1	.0	.0	.0	.0
Total	55.2	2.0	17.0	.0	.2	.5	9.8	.0	23.9	1.8	.0	.0	.0
Maine													
Productive reserved	220.7	20.9	120.1	.0	.0	1.9	.0	.0	17.1	47.9	12.8	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	633.6	6.6	553.0	.0	.0	.0	.0	.0	38.3	35.7	.0	.0	.0
Total	854.3	27.5	673.1	.0	.0	1.9	.0	.0	55.4	83.6	12.8	.0	.0
Massachusetts													
Productive reserved	104.5	22.6	3.2	.0	6.8	6.7	16.2	.0	36.2	6.4	6.4	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	50.1	14.5	.0	.0	.0	.0	4.0	.0	31.6	.0	.0	.0	.0
Total	154.6	37.1	3.2	.0	6.8	6.7	20.2	.0	67.8	6.4	6.4	.0	.0
New Hampshire													
Productive reserved	58.7	13.3	12.1	.0	.3	.6	2.7	.0	7.7	17.5	4.5	.0	.0
Productive deferred	25.0	.0	1.0	.0	.0	.0	.0	.0	.0	24.0	.0	.0	.0
Other forest land	237.8	.0	49.7	.0	.0	.0	.0	.0	51.6	98.0	38.5	.0	.0
Total	321.5	13.3	62.8	.0	.3	.6	2.7	.0	59.3	139.5	43.0	.0	.0
Rhode Island													
Productive reserved	8.9	.0	.0	.0	.0	1.4	4.5	.0	3.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	8.9	.0	.0	.0	.0	1.4	4.5	.0	3.0	.0	.0	.0	.0
Vermont													
Productive reserved	61.5	2.1	23.5	.0	.0	.4	.4	.0	2.1	31.4	1.6	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	20.3	.0	17.1	.0	.0	.0	.0	.0	1.7	1.5	.0	.0	.0
Total	81.8	2.1	40.6	.0	.0	.4	4	.0	3.8	32.9	1.6	.0	.0
Total													
Productive reserved	484.8	60.9	174.1	.0	7.3	11.5	31.8	.0	68.9	105.0	25.3	.0	.0
Productive deferred	25.0	.0	1.0	.0	.0	.0	.0	.0	.0	24.0	.0	.0	.0
Other forest land	966.5	21.1	621.6	.0	.0	.0	5.8	.0	144.3	135.2	38.5	.0	.0
Total	1,476.3	82.0	796.7	.0	7.3	11.5	37.6	.0	213.2	264.2	63.8	.0	.0
Middle Atlantic:													
Delaware													
Productive reserved	1.8	.0	.0	.0	.0	.0	1.8	.0	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	5.6	.0	.0	.0	.0	.0	5.6	.0	.0	.0	.0	.0	.0
Total	7.4	.0	.0	.0	.0	.0	7.4	.0	.0	.0	.0	.0	.0
Maryland													
Productive reserved	108.9	5.4	.4	.0	20.6	11.4	45.4	4.6	15.9	5.2	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	21.6	.0	.0	.0	.0	.0	21.6	.0	.0	.0	.0	.0	.0
Total	130.5	5.4	.4	.0	20.6	11.4	67.0	4.6	15.9	5.2	.0	.0	.0
New Jersey													
Productive reserved	34.0	1.5	.0	.0	11.7	4.4	11.2	.0	3.7	1.5	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	37.6	.0	.0	.0	.0	19.1	18.5	.0	.0	.0	.0	.0	.0
Total	71.6	1.5	.0	.0	11.7	23.5	29.7	.0	3.7	1.5	.0	.0	.0
New York													
Productive reserved	2,567.3	52.3	561.0	.0	.0	5.5	27.5	.0	.0	1,704.5	216.5	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	407.8	22.6	227.7	.0	.0	43.7	46.1	.0	58.6	.0	9.1	.0	.0
Total	2,975.1	74.9	788.7	.0	.0	49.2	73.6	.0	58.6	1,704.5	225.6	.0	.0
Pennsylvania													
Productive reserved	532.0	39.1	13.6	.0	.0	6.7	253.2	.0	3.5	192.9	23.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	370.2	.0	.0	.0	.0	2.7	350.1	.0	13.9	1.3	2.2	.0	.0
Total	902.2	39.1	13.6	.0	.0	9.4	603.3	.0	17.4	194.2	25.2	.0	.0

Table 3.2—*Area of productive reserved, productive deferred, and other forest land in the eastern United States, by forest type, section, region, and State, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and State	Total	Forest type: Commercial: White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked	Non-commercial
West Virginia													
Productive reserved	124.4	.0	3.0	.0	11.4	.9	50.8	.0	1.8	56.5	.0	.0	.0
Productive deferred	36.0	.0	.0	.0	.0	.0	.0	.0	.0	36.0	.0	.0	.0
Other forest land	24.5	.0	5.0	.0	5.9	11.6	1.0	.0	.0	1.0	.0	.0	.0
Total	184.9	.0	8.0	.0	17.3	12.5	51.8	.0	1.8	93.5	.0	.0	.0
Total													
Productive reserved	3,368.4	98.3	578.0	.0	43.7	28.9	389.9	4.6	24.9	1,960.6	239.5	.0	.0
Productive deferred	36.0	.0	.0	.0	.0	.0	.0	.0	.0	36.0	.0	.0	.0
Other forest land	867.3	22.6	232.7	.0	5.9	77.1	442.9	.0	72.5	2.3	11.3	.0	.0
Total	4,271.7	120.9	810.7	.0	49.6	106.0	832.8	4.6	97.4	1,998.9	250.8	.0	.0
Lake States:													
Michigan													
Productive reserved	268.2	8.2	74.8	.0	.0	.0	19.0	.0	16.5	87.6	62.1	.0	.0
Productive deferred	19.0	4.0	3.0	.0	.0	.0	.0	.0	.0	3.0	8.0	1.0	.0
Other forest land	205.0	23.5	128.2	.0	.0	.0	.0	.0	31.8	.0	21.5	.0	.0
Total	492.2	35.7	206.0	.0	.0	.0	19.0	.0	48.3	90.6	91.6	1.0	.0
Minnesota													
Productive reserved	1,175.6	280.1	189.2	.0	.0	.0	11.4	.0	38.3	21.1	632.9	2.6	.0
Productive deferred	3.0	.0	.0	.0	.0	.0	.0	.0	.0	2.0	1.0	.0	.0
Other forest land	1,835.5	10.3	1,409.4	.0	.0	.0	100.2	.0	187.6	7.6	109.1	11.3	.0
Total	3,014.1	290.4	1,598.6	.0	.0	.0	111.6	.0	225.9	30.7	743.0	13.9	.0
North Dakota													
Productive reserved	3.2	.0	.0	.0	.0	.0	.6	.0	1.4	.0	.9	.3	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	13.6	.0	.0	.0	.0	.0	2.4	.0	5.6	.0	4.5	1.1	.0
Total	16.8	.0	.0	.0	.0	.0	3.0	.0	7.0	.0	5.4	1.4	.0
South Dakota (East)													
Productive reserved	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	111.7	21.9	.0	.0	.0	.0	21.4	.0	66.7	.0	.0	1.7	.0
Total	111.7	21.9	.0	.0	.0	.0	21.4	.0	66.7	.0	.0	1.7	.0
Wisconsin													
Productive reserved	34.2	2.9	.6	.0	.0	.0	13.9	.0	1.7	7.4	6.7	1.0	.0
Productive deferred	14.0	2.0	2.0	.0	.0	.0	.0	.0	.0	4.0	6.0	.0	.0
Other forest land	381.5	9.5	226.2	.0	.0	.0	11.4	.0	102.6	2.9	17.2	11.7	.0
Total	429.7	14.4	228.8	.0	.0	.0	25.3	.0	104.3	14.3	29.9	12.7	.0
Total													
Productive reserved	1,481.2	291.2	264.6	.0	.0	.0	44.9	.0	57.9	116.1	702.6	3.9	.0
Productive deferred	36.0	6.0	5.0	.0	.0	.0	.0	.0	.0	9.0	15.0	1.0	.0
Other forest land	2,547.3	65.2	1,763.8	.0	.0	.0	135.4	.0	394.3	10.5	152.3	25.8	.0
Total	4,064.5	362.4	2,033.4	.0	.0	.0	180.3	.0	452.2	135.6	869.9	30.7	.0
Central:													
Illinois													
Productive reserved	44.9	.0	.0	.0	2.0	.0	31.8	.0	11.1	.0	.0	.0	.0
Productive deferred	8.2	.0	.0	.0	2.3	.0	5.0	.0	.3	.0	.0	.6	.0
Other forest land	65.0	.0	.0	.0	1.0	.3	39.1	.4	23.8	.3	.1	.0	.0
Total	118.1	.0	.0	.0	5.3	.3	75.9	.4	35.2	.3	.1	.6	.0
Indiana													
Productive reserved	38.5	.0	.0	.0	.5	.0	28.7	.0	2.3	7.0	.0	.0	.0
Productive deferred	9.0	.0	.0	.0	1.0	.0	8.0	.0	.0	.0	.0	.0	.0
Other forest land	80.4	.0	.0	.0	.0	.0	50.0	.0	12.5	17.9	.0	.0	.0
Total	127.9	.0	.0	.0	1.5	.0	86.7	.0	14.8	24.9	.0	.0	.0
Iowa													
Productive reserved	75.9	.2	.0	.0	.0	.0	46.4	.0	29.0	.3	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	25.2	.0	.0	.0	.0	5.5	19.7	.0	.0	.0	.0	.0	.0
Total	101.1	.2	.0	.0	.0	5.5	66.1	.0	29.0	.3	.0	.0	.0
Kansas													
Productive reserved	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	157.4	.0	.0	.0	.0	.0	138.1	.0	19.3	.0	.0	.0	.0
Total	157.4	.0	.0	.0	.0	.0	138.1	.0	19.3	.0	.0	.0	.0

Table 3.2—*Area of productive reserved, productive deferred, and other forest land in the eastern United States, by forest type, section, region, and State, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and State	Total	Forest type											
		Commercial											
		White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked	Non-commercial
Kentucky													
Productive reserved	212.8	.0	.0	.0	12.8	.6	175.8	.0	10.8	12.8	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	46.1	.0	.0	.0	.0	26.9	16.7	.0	2.5	.0	.0	.0	.0
Total	258.9	.0	.0	.0	12.8	27.5	192.5	.0	13.3	12.8	.0	.0	.0
Missouri													
Productive reserved	256.1	.0	.0	.0	2.7	1.6	227.9	.1	23.7	.1	.0	.0	.0
Productive deferred	33.0	.0	.0	.0	4.0	5.0	22.0	.0	.0	.0	.0	2.0	.0
Other forest land	298.3	.0	.0	.0	42.0	62.8	193.5	.0	.0	.0	.0	0	.0
Total	587.4	.0	.0	.0	48.7	69.4	443.4	.1	23.7	.1	.0	2.0	.0
Nebraska													
Productive reserved	13.8	2.7	.0	.0	.0	.0	1.4	.0	4.9	.0	.0	4.8	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	226.5	34.7	.0	.0	.0	.0	23.1	.0	82.7	.0	.0	86.0	.0
Total	240.3	37.4	.0	.0	.0	.0	24.5	.0	87.6	.0	.0	90.8	.0
Ohio													
Productive reserved	102.4	.7	.0	.0	3.0	3.0	62.7	.0	8.3	21.7	3.0	.0	.0
Productive deferred	6.0	.0	.0	.0	1.0	.0	5.0	.0	.0	.0	.0	.0	.0
Other forest land	9.4	.0	.0	.0	.0	6.3	.0	.0	3.1	.0	.0	.0	.0
Total	117.8	.7	.0	.0	4.0	9.3	67.7	.0	11.4	21.7	3.0	.0	.0
Total													
Productive reserved	744.4	3.6	.0	.0	21.0	5.2	574.7	.1	90.1	41.9	3.0	4.8	.0
Productive deferred	56.2	.0	.0	.0	8.3	5.0	40.0	.0	.3	.0	.0	2.6	.0
Other forest land	908.3	34.7	.0	.0	43.0	101.8	480.2	4	143.9	18.2	.1	86.0	.0
Total	1,708.9	38.3	.0	.0	72.3	112.0	1,094.9	.5	234.3	60.1	3.1	93.4	.0
Total, North													
Productive reserved	6,078.8	454.0	1,016.7	.0	72.0	45.6	1,041.3	4.7	241.8	2,223.6	970.4	8.7	.0
Productive deferred	153.2	6.0	6.0	.0	8.3	5.0	40.0	.0	.3	69.0	15.0	3.6	.0
Other forest land	5,289.4	143.6	2,618.1	.0	48.9	178.9	1,064.3	.4	755.0	166.2	202.2	111.8	.0
Total	11,521.4	603.6	3,640.8	.0	129.2	229.5	2,145.6	5.1	997.1	2,458.8	1,187.6	124.1	.0
South Atlantic:													
North Carolina													
Productive reserved	433.8	3.9	4.7	.6	24.7	10.0	383.7	1.2	.0	5.0	.0	.0	.0
Productive deferred	1.1	.1	.0	.0	.4	.0	.4	.0	.0	.1	.0	.1	.0
Other forest land	46.2	.0	1.2	.0	26.3	.5	10.3	7.9	.0	.0	.0	.0	.0
Total	481.1	4.0	5.9	6	51.4	10.5	394.4	9.1	.0	5.1	.0	.1	.0
South Carolina													
Productive reserved	59.2	.0	.0	2.9	2.1	10.4	42.4	1.4	.0	.0	.0	.0	.0
Productive deferred	1.5	.0	.0	.0	.5	.8	.2	.0	.0	.0	.0	.0	.0
Other forest land	12.6	.0	.0	.0	.0	.0	8.7	3.9	.0	.0	.0	.0	.0
Total	73.3	.0	.0	2.9	2.6	11.2	51.3	5.3	.0	.0	.0	.0	.0
Virginia													
Productive reserved	374.6	.0	.0	.0	27.1	9.8	291.3	46.4	.0	.0	.0	.0	.0
Productive deferred	34.0	2.7	.0	.0	.8	2.2	23.0	.0	.0	5.1	.0	.2	.0
Other forest land	70.0	.0	.0	.0	.0	.0	70.0	.0	.0	.0	0	.0	.0
Total	478.6	2.7	.0	.0	27.9	12.0	384.3	46.4	.0	5.1	.0	.2	.0
Total													
Productive reserved	867.6	3.9	4.7	3.5	53.9	30.2	717.4	49.0	.0	5.0	.0	.0	.0
Productive deferred	36.6	2.8	.0	.0	1.7	3.0	23.6	.0	.0	5.2	.0	.3	.0
Other forest land	128.8	.0	1.2	.0	26.3	.5	89.0	11.8	.0	.0	.0	.0	.0
Total	1,033.0	6.7	5.9	3.5	81.9	33.7	830.0	60.8	.0	10.2	.0	.3	.0
East Gulf:													
Florida													
Productive reserved	114.5	.0	.0	22.7	.0	2.1	2.9	86.8	.0	.0	.0	.0	.0
Productive deferred	1.1	.0	.0	1.0	.0	.0	.0	.1	.0	.0	.0	.0	.0
Other forest land	1,594.1	.0	.0	201.4	.0	3.3	9.9	1,379.5	.0	.0	.0	.0	.0
Total	1,709.7	.0	.0	225.1	.0	5.4	12.8	1,466.4	.0	.0	.0	.0	.0
Georgia													
Productive reserved	413.5	.0	.0	49.0	9.3	37.8	14.1	303.3	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	30.2	.0	.0	.0	.0	.0	.0	30.2	.0	.0	.0	.0	.0
Total	443.7	.0	.0	49.0	9.3	37.8	14.1	333.5	.0	.0	.0	0	0
Total													
Productive reserved	528.0	.0	.0	71.7	9.3	39.9	17.0	390.1	.0	.0	.0	.0	.0
Productive deferred	1.1	.0	.0	1.0	.0	.0	.0	.1	.0	.0	.0	.0	.0
Other forest land	1,624.3	.0	.0	201.4	.0	3.3	9.9	1,409.7	.0	.0	.0	.0	.0
Total	2,153.4	.0	.0	274.1	9.3	43.2	26.9	1,799.9	.0	.0	.0	0	0

Table 3.2—*Area of productive reserved, productive deferred, and other forest land in the eastern United States, by forest type, section, region, and State, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and State	Total	Forest type											
		Commercial											Non-commercial
		White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked	
Central Gulf:													
Alabama													
Productive reserved	28.0	.0	.0	1.6	14.5	7.3	4.6	.0	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	28.0	.0	.0	1.6	14.5	7.3	4.6	.0	.0	.0	.0	.0	.0
Mississippi													
Productive reserved	211.3	.0	.0	6.2	21.0	40.0	108.7	35.4	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	211.3	.0	.0	6.2	21.0	40.0	108.7	35.4	.0	.0	.0	.0	.0
Tennessee													
Productive reserved	322.2	56.8	15.9	.0	11.8	45.6	158.2	.0	.0	33.9	.0	.0	.0
Productive deferred	18.5	3.3	.9	.0	.7	2.6	9.1	.0	.0	1.9	.0	.0	.0
Other forest land	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	340.7	60.1	16.8	.0	12.5	48.2	167.3	.0	.0	35.8	.0	.0	.0
Total													
Productive reserved	561.5	56.8	15.9	7.8	47.3	92.9	271.5	35.4	.0	33.9	.0	.0	.0
Productive deferred	18.5	3.3	.9	.0	.7	2.6	9.1	.0	.0	1.9	.0	.0	.0
Other forest land	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	580.0	60.1	16.8	7.8	48.0	95.5	280.6	35.4	.0	35.8	.0	.0	.0
West Gulf:													
Arkansas													
Productive reserved	39.1	.0	.0	.0	13.9	7.3	17.6	.3	.0	.0	.0	.0	.0
Productive deferred	13.3	.0	.0	.0	3.1	2.6	6.2	1.3	.1	.0	.0	.0	.0
Other forest land	22.4	.0	.0	.0	.0	.0	22.4	.0	.0	.0	.0	.0	.0
Total	74.8	.0	.0	.0	17.0	9.9	46.2	1.6	.1	.0	.0	.0	.0
Louisiana													
Productive reserved	18.3	.0	.0	16.8	1.5	.0	.0	.0	.0	.0	.0	.0	.0
Productive deferred	13.2	.0	.0	2.2	6.3	2.6	.9	1.2	.0	.0	.0	.0	.0
Other forest land	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	31.5	.0	.0	19.0	7.8	2.6	.9	1.2	.0	.0	.0	.0	.0
Oklahoma													
Productive reserved	32.4	.0	.0	.0	12.8	4.9	14.7	.0	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	4,157.5	.0	.0	.0	.0	.0	.0	550.5	.0	.0	.0	.0	3,607.0
Total	4,189.9	.0	.0	.0	12.8	4.9	14.7	550.5	.0	.0	.0	.0	3,607.0
Texas													
Productive reserved	14.9	.0	.0	.4	9.7	3.2	1.6	.0	.0	.0	.0	.0	.0
Productive deferred	18.1	.0	.0	.5	13.9	2.3	.7	.5	.2	.0	.0	.0	.0
Other forest land	10,733.8	.0	.0	.0	20.0	20.2	1,519.9	44.2	.0	.0	.0	.0	9,129.5
Total	10,766.8	.0	.0	.9	43.6	25.7	1,522.2	44.7	.2	.0	.0	.0	9,129.5
Total													
Productive reserved	104.7	.0	.0	17.2	37.9	15.4	33.9	.3	.0	.0	.0	.0	.0
Productive deferred	44.6	.0	.0	2.7	23.3	7.5	7.8	3.0	.3	.0	.0	.0	.0
Other forest land	14,913.7	.0	.0	.0	20.0	20.2	1,542.3	594.7	.0	.0	.0	.0	12,736.5
Total	15,063.0	.0	.0	19.9	81.2	43.1	1,584.0	598.0	.3	.0	.0	.0	12,736.5
Total, South													
Productive reserved	2,061.8	60.7	20.6	100.2	148.4	178.4	1,039.8	474.8	.0	38.9	.0	.0	.0
Productive deferred	100.8	6.1	.9	3.7	25.7	13.1	40.5	3.1	.3	7.1	.0	.3	.0
Other forest land	16,666.8	.0	1.2	201.4	46.3	24.0	1,641.2	2,016.2	.0	.0	.0	.0	12,736.5
Total	18,829.4	66.8	22.7	305.3	220.4	215.5	2,721.5	2,494.1	.3	46.0	.0	.3	12,736.5
Total, eastern regions													
Productive reserved	8,140.6	514.7	1,037.3	100.2	220.4	224.0	2,081.1	479.5	241.8	2,262.5	970.4	8.7	.0
Productive deferred	254.0	12.1	6.9	3.7	34.0	18.1	80.5	3.1	.6	76.1	15.0	3.9	.0
Other forest land	21,956.2	143.6	2,619.3	201.4	95.2	202.9	2,705.5	2,016.6	755.0	166.2	202.2	111.8	12,736.5
Total	30,350.8	670.4	3,663.5	305.3	349.6	445.0	4,867.1	2,499.2	997.4	2,504.8	1,187.6	124.4	12,736.5

Table 3.3—*Area of productive reserved, productive deferred, and other forest land in the western United States, by forest type, section, region, and State, January 1, 1977*

[Thousand acres]

Section, region and State	Total	Forest type: Commercial: Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Other western softwoods	Western hardwoods	Nonstocked	Noncommercial: Total	Chaparral	Pinyon-juniper	Other
Pacific Northwest:																
Alaska:																
Coastal																
Productive reserved	193.3	.0	.0	.0	.0	193.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Productive deferred	318.8	.0	.0	.0	.0	314.1	.0	.0	.0	.0	4.7	.0	.0	.0	.0	.0
Other forest land	5,788.6	.0	.0	.0	.0	5,359.1	.0	280.2	.0	.0	149.3	.0	.0	.0	.0	.0
Total	6,300.7	.0	.0	.0	.0	5,866.5	.0	280.2	.0	.0	154.0	.0	.0	.0	.0	.0
Interior																
Productive reserved	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	101,694.1	.0	.0	.0	81,863.7	.0	.0	.0	.0	.0	19,830.4	.0	.0	.0	.0	.0
Total	101,694.1	.0	.0	.0	81,863.7	.0	.0	.0	.0	.0	19,830.4	.0	.0	.0	.0	.0
Summary																
Productive reserved	193.3	.0	.0	.0	.0	193.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Productive deferred	318.8	.0	.0	.0	.0	314.1	.0	.0	.0	.0	4.7	.0	.0	.0	.0	.0
Other forest land	107,482.7	.0	.0	.0	81,863.7	5,359.1	.0	280.2	.0	.0	19,979.7	.0	.0	.0	.0	.0
Total	107,994.8	.0	.0	.0	81,863.7	5,866.5	.0	280.2	.0	.0	19,984.4	.0	.0	.0	.0	.0
Oregon:																
Western																
Productive reserved	304.0	64.0	3.0	1.0	129.0	8.0	.0	69.0	.0	.0	30.0	.0	.0	.0	.0	.0
Productive deferred	109.0	25.0	.0	.0	77.0	.0	.0	.0	.0	.0	7.0	.0	.0	.0	.0	.0
Other forest land	1,090.0	394.0	92.0	.0	102.0	28.0	.0	39.0	.0	.0	65.0	23.0	347.0	40.0	13.0	294.0
Total	1,503.0	483.0	95.0	1.0	308.0	36.0	.0	108.0	.0	.0	102.0	23.0	347.0	40.0	13.0	294.0
Eastern																
Productive reserved	413.0	4.0	136.0	.0	155.0	.0	.0	118.0	.0	.0	.0	.0	.0	.0	.0	.0
Productive deferred	175.0	34.0	41.0	.0	70.0	.0	.0	30.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	3,508.0	137.0	431.0	.0	221.0	.0	7.0	51.0	.0	.0	13.0	.0	2,648.0	24.0	2,404.0	220.0
Total	4,096.0	175.0	608.0	.0	446.0	.0	7.0	199.0	.0	.0	13.0	.0	2,648.0	24.0	2,404.0	220.0
Summary																
Productive reserved	717.0	68.0	139.0	1.0	284.0	8.0	.0	187.0	.0	.0	30.0	.0	.0	.0	.0	.0
Productive deferred	284.0	59.0	41.0	.0	147.0	.0	.0	30.0	.0	.0	7.0	.0	.0	.0	.0	.0
Other forest land	4,598.0	531.0	523.0	.0	323.0	28.0	7.0	90.0	.0	.0	78.0	23.0	2,995.0	64.0	2,417.0	514.0
Total	5,599.0	658.0	703.0	1.0	754.0	36.0	7.0	307.0	.0	.0	115.0	23.0	2,995.0	64.0	2,417.0	514.0
Washington:																
Western																
Productive reserved	1,024.0	268.0	.0	.0	448.0	296.0	.0	2.0	.0	.0	8.0	2.0	.0	.0	.0	.0
Productive deferred	150.0	59.0	.0	.0	91.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	1,645.0	370.0	.0	.0	717.0	419.0	.0	1.0	.0	.0	110.0	.0	28.0	.0	.0	28.0
Total	2,819.0	697.0	.0	.0	1,256.0	715.0	.0	3.0	.0	.0	118.0	2.0	28.0	.0	.0	28.0
Eastern																
Productive reserved	720.0	47.0	36.0	3.0	591.0	2.0	2.0	39.0	.0	.0	.0	.0	.0	.0	.0	.0
Productive deferred	168.0	47.0	12.0	5.0	101.0	.0	.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	1,552.0	399.0	219.0	5.0	635.0	27.0	38.0	126.0	.0	.0	18.0	79.0	6.0	.0	.0	6.0
Total	2,440.0	493.0	267.0	13.0	1,327.0	29.0	40.0	168.0	.0	.0	18.0	79.0	6.0	.0	.0	6.0
Summary																
Productive reserved	1,744.0	315.0	36.0	3.0	1,039.0	298.0	2.0	41.0	.0	.0	8.0	2.0	.0	.0	.0	.0
Productive deferred	318.0	106.0	12.0	5.0	192.0	.0	.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	3,197.0	769.0	219.0	5.0	1,352.0	446.0	38.0	127.0	.0	.0	128.0	79.0	34.0	.0	.0	34.0
Total	5,259.0	1,190.0	267.0	13.0	2,583.0	744.0	40.0	171.0	.0	.0	136.0	81.0	34.0	.0	.0	34.0
Total																
Productive reserved	2,654.3	383.0	175.0	4.0	1,323.0	499.3	2.0	228.0	.0	.0	38.0	2.0	.0	.0	.0	.0
Productive deferred	920.8	165.0	53.0	5.0	339.0	314.1	.0	33.0	.0	.0	11.7	.0	.0	.0	.0	.0
Other forest land	115,277.7	1,300.0	742.0	5.0	83,538.7	5,833.1	45.0	497.2	.0	.0	20,185.7	102.0	3,029.0	64.0	2,417.0	548.0
Total	118,852.8	1,848.0	970.0	14.0	85,200.7	6,646.5	47.0	758.2	.0	.0	20,235.4	104.0	3,029.0	64.0	2,417.0	548.0
Pacific Southwest:																
California																
Productive reserved	1,365.0	207.0	394.0	15.0	453.0	10.0	.0	123.0	119.0	.0	44.0	.0	.0	.0	.0	.0
Productive deferred	268.0	51.0	108.0	1.0	78.0	2.0	.0	21.0	.0	.0	7.0	.0	.0	.0	.0	.0
Other forest land	22,216.0	274.0	2,314.0	64.0	1,447.0	90.0	.0	642.0	5.0	.0	1,319.0	32.0	16,029.0	7,554.0	2,696.0	5,779.0
Total	23,849.0	532.0	2,816.0	80.0	1,978.0	102.0	.0	786.0	124.0	.0	1,370.0	32.0	16,029.0	7,554.0	2,696.0	5,779.0
Hawaii																
Productive reserved	114.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	114.0	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	924.0	.0	.0	.0	.0	.0	.0	0	.0	.0	.0	.0	924.0	.0	.0	924.0
Total	1,038.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	114.0	.0	924.0	.0	0	924.0

Table 3.3—*Area of productive reserved, productive deferred, and other forest land in the western United States, by forest type, section, region, and State, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and State	Total	Forest type: Commercial: Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Other western softwoods	Western hardwoods	Nonstocked	Noncommercial: Total	Chaparral	Pinyon-juniper	Other
Total																
Productive reserved	1,479.0	207.0	394.0	15.0	453.0	10.0	.0	123.0	119.0	.0	158.0	.0	.0	.0	.0	.0
Productive deferred	268.0	51.0	108.0	1.0	78.0	2.0	.0	21.0	.0	.0	7.0	.0	.0	.0	.0	.0
Other forest land	23,140.0	274.0	2,314.0	64.0	1,447.0	90.0	.0	642.0	5.0	.0	1,319.0	32.0	16,953.0	7,554.0	2,696.0	6,703.0
Total	24,887.0	532.0	2,816.0	80.0	1,978.0	102.0	.0	786.0	124.0	.0	1,484.0	32.0	16,953.0	7,554.0	2,696.0	6,703.0
Total, Pacific Coast																
Productive reserved	4,133.3	590.0	569.0	19.0	1,776.0	509.3	2.0	351.0	119.0	.0	196.0	2.0	.0	.0	.0	.0
Productive deferred	1,188.8	216.0	161.0	6.0	417.0	316.1	.0	54.0	.0	.0	18.7	.0	.0	.0	.0	.0
Other forest land	138,417.7	1,574.0	3,056.0	69.0	84,985.7	5,923.1	45.0	1,139.2	5.0	.0	21,504.7	134.0	19,982.0	7,618.0	5,113.0	7,251.0
Total	143,739.8	2,380.0	3,786.0	94.0	87,178.7	6,748.5	47.0	1,544.2	124.0	.0	21,719.4	136.0	19,982.0	7,618.0	5,113.0	7,251.0
Northern Rocky Mtn.:																
Idaho																
Productive reserved	1,913.0	694.1	143.9	6.4	373.2	46.3	41.8	539.2	.0	49.1	19.0	.0	.0	.0	.0	.0
Productive deferred	935.3	367.7	116.2	1.7	180.9	18.9	20.8	201.5	.0	18.4	9.2	.0	.0	.0	.0	.0
Other forest land	5,337.7	1,575.8	341.7	11.7	989.1	47.1	46.6	897.9	.0	487.9	355.6	.0	584.3	180.0	404.3	.0
Total	8,186.0	2,637.6	601.8	19.8	1,543.2	112.3	109.2	1,638.6	.0	555.4	383.8	.0	584.3	180.0	404.3	.0
Montana																
Productive reserved	2,001.8	260.4	52.7	2.6	333.7	17.1	151.8	927.9	.0	242.6	13.0	.0	.0	.0	.0	.0
Productive deferred	708.7	167.7	17.3	1.8	121.2	3.7	31.2	318.9	.0	42.6	4.3	.0	.0	.0	.0	.0
Other forest land	5,489.4	689.8	242.7	2.1	633.5	29.4	44.1	1,035.1	.0	1,372.6	324.4	.0	1,115.7	345.4	476.2	294.1
Total	8,199.9	1,117.9	312.7	6.5	1,088.4	50.2	227.1	2,281.9	.0	1,657.8	341.7	.0	1,115.7	345.4	476.2	294.1
South Dakota (West)																
Productive reserved	11.1	.0	11.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	112.1	.0	67.4	.0	.7	.0	.0	.0	.0	3.8	35.8	.0	4.4	.0	4.4	.0
Total	123.2	.0	78.5	.0	.7	.0	.0	.0	.0	3.8	35.8	.0	4.4	.0	4.4	.0
Wyoming																
Productive reserved	2,688.6	237.4	.2	.0	618.0	.0	.0	1,657.2	.0	163.3	12.5	.0	.0	.0	.0	.0
Productive deferred	331.3	65.9	1.2	.0	105.8	.0	.0	109.6	.0	44.4	4.4	.0	.0	.0	.0	.0
Other forest land	2,674.2	345.1	80.5	.0	598.3	.0	.0	436.4	.0	225.2	240.8	.0	747.9	134.0	577.7	36.2
Total	5,694.1	648.4	81.9	.0	1,322.1	.0	.0	2,203.2	.0	432.9	257.7	.0	747.9	134.0	577.7	36.2
Total																
Productive reserved	6,614.5	1,191.9	207.9	9.0	1,324.9	63.4	193.6	3,124.3	.0	455.0	44.5	.0	.0	.0	.0	.0
Productive deferred	1,975.3	601.3	134.7	3.5	407.9	22.6	52.0	630.0	.0	105.4	17.9	.0	.0	.0	.0	.0
Other forest land	13,613.4	2,610.7	732.3	13.8	2,221.6	76.5	90.7	2,369.4	.0	2,089.5	956.6	.0	2,452.3	659.4	1,462.6	330.3
Total	22,203.2	4,403.9	1,074.9	26.3	3,954.4	162.5	336.3	6,123.7	.0	2,649.9	1,019.0	.0	2,452.3	659.4	1,462.6	330.3
Southern Rocky Mtn.:																
Arizona																
Productive reserved	382.8	37.9	332.8	.0	8.4	.0	.0	.0	.0	.0	3.7	.0	.0	.0	.0	.0
Productive deferred	19.1	4.1	13.5	.0	.4	.0	.0	.0	.0	.0	1.1	.0	.0	.0	.0	.0
Other forest land	14,196.4	.7	421.3	.0	.7	.0	.0	.0	.0	.0	118.4	.0	13,655.3	1,629.0	12,026.3	.0
Total	14,598.3	42.7	767.6	.0	9.5	.0	.0	.0	.0	.0	123.2	.0	13,655.3	1,629.0	12,026.3	.0
Colorado																
Productive reserved	684.0	17.6	22.2	.0	506.4	.0	.0	109.0	.0	.2	28.6	.0	.0	.0	.0	.0
Productive deferred	752.2	31.2	24.3	.0	446.6	.0	.0	169.1	.0	.1	80.9	.0	.0	.0	.0	.0
Other forest land	9,520.1	139.4	210.3	.0	612.5	.0	.0	248.0	.0	7.2	520.6	.0	7,782.1	2,998.7	4,407.0	376.4
Total	10,956.3	188.2	256.8	.0	1,565.5	.0	.0	526.1	.0	7.5	630.1	.0	7,782.1	2,998.7	4,407.0	376.4
Nevada																
Productive reserved	5.9	.8	.8	.0	3.6	.0	.0	.0	.0	.0	.7	.0	.0	.0	.0	.0
Productive deferred	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Other forest land	7,543.1	16.3	13.5	.0	108.0	.0	.0	46.1	.0	1,267.9	242.8	.0	5,848.5	1,188.8	4,659.2	.5
Total	7,549.0	17.1	14.3	.0	111.6	.0	.0	46.1	.0	1,267.9	243.5	.0	5,848.5	1,188.8	4,659.2	.5
New Mexico																
Productive reserved	550.5	152.2	252.4	.0	111.7	.0	.0	.0	.0	.1	34.1	.0	.0	.0	.0	.0
Productive deferred	279.5	98.0	123.1	.0	36.0	.0	.0	.0	.0	.0	22.4	.0	.0	.0	.0	.0
Other forest land	11,692.3	55.4	461.5	.0	18.8	.0	.0	.0	.0	4.6	45.7	.0	11,106.3	427.6	10,678.7	.0
Total	12,522.3	305.6	837.0	.0	166.5	.0	.0	.0	.0	4.7	102.2	.0	11,106.3	427.6	10,678.7	.0
Utah																
Productive reserved	152.6	38.7	6.5	.0	57.8	.0	.0	39.9	.0	2.2	7.5	.0	.0	.0	.0	.0
Productive deferred	157.3	20.2	15.4	.0	63.7	.0	.0	41.9	.0	.1	16.0	.0	.0	.0	.0	.0
Other forest land	11,842.9	211.6	94.5	.0	414.7	.0	.0	161.0	.0	6.7	1,040.7	.0	9,913.7	955.5	8,958.2	.0
Total	12,152.8	270.5	116.4	.0	536.2	.0	.0	242.8	.0	9.0	1,064.2	.0	9,913.7	955.5	8,958.2	.0

Table 3.3—*Area of productive reserved, productive deferred, and other forest land in the western United States, by forest type, section, region, and State, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and State	Total	Forest type														
		Commercial											Noncommercial			
		Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hem-lock-Sitka spruce	Larch	Lodge-pole pine	Red-wood	Other western soft-woods	Western hard-woods	Non-stocked	Total	Chaparral	Pinyon-juniper	Other
Total																
Productive reserved	1,775.8	247.2	614.7	.0	687.9	.0	.0	148.9	.0	2.5	74.6	.0	.0	.0	.0	.0
Productive deferred	1,208.1	153.5	176.3	.0	546.7	.0	.0	211.0	.0	.2	120.4	.0	.0	.0	.0	.0
Other forest land	54,794.8	423.4	1,201.1	.0	1,154.7	.0	.0	455.1	.0	1,286.4	1,968.2	.0	48,305.9	7,199.6	40,729.4	376.9
Total	57,778.7	824.1	1,992.1	.0	2,389.3	.0	.0	815.0	.0	1,289.1	2,163.2	.0	48,305.9	7,199.6	40,729.4	376.9
Total, Rocky Mtn.																
Productive reserved	8,390.3	1,439.1	822.6	9.0	2,012.8	63.4	193.6	3,273.2	.0	457.5	119.1	.0	.0	.0	.0	.0
Productive deferred	3,183.4	754.8	311.0	3.5	954.6	22.6	52.0	841.0	.0	105.6	138.3	.0	.0	.0	.0	.0
Other forest land	68,408.2	3,034.1	1,933.4	13.8	3,376.3	76.5	90.7	2,824.5	.0	3,375.9	2,924.8	.0	50,758.2	7,859.0	42,192.0	707.2
Total	79,981.9	5,228.0	3,067.0	26.3	6,343.7	162.5	336.3	6,938.7	.0	3,939.0	3,182.2	.0	50,758.2	7,859.0	42,192.0	707.2
Total, western regions																
Productive reserved	12,523.6	2,029.1	1,391.6	28.0	3,788.8	572.7	195.6	3,624.2	119.0	457.5	315.1	2.0	.0	.0	.0	.0
Productive deferred	4,372.2	970.8	472.0	9.5	1,371.6	338.7	52.0	895.0	.0	105.6	157.0	.0	.0	.0	.0	.0
Other forest land	206,825.9	4,608.1	4,989.4	82.8	88,362.0	5,999.6	135.7	3,963.7	5.0	3,375.9	24,429.5	134.0	70,740.2	15,477.0	47,305.0	7,958.2
Total	223,721.7	7,608.0	6,853.0	120.3	93,522.4	6,911.0	383.3	8,482.9	124.0	3,939.0	24,901.6	136.0	70,740.2	15,477.0	47,305.0	7,958.2

Table 3.4—*Area of commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977*[1]

[Thousand acres]

Section, region and State	Year	All owner-ships	Public									Private				
				Federal									Farmer and other private		
			Total public	Total Federal	National Forest	Bureau of Land Manage-ment	Other	Indian	State	County and munic-ipal	Total private	Forest industry	Total	Farmer	Other
New England:															
Connecticut	1977	1,805.6	146.6	2.4	.0	.0	2.4	.0	119.8	24.4	1,659.0	.0	1,659.0	128.3	1,530.7
	1970	1,823.2	155.0	1.0	.0	.0	1.0	.0	122.0	32.0	1,668.2	3.0	1,665.2	304.0	1,361.2
	1962	1,893.7	155.0	1.0	.0	.0	1.0	.0	122.0	32.0	1,738.7	3.0	1,735.7	414.0	1,321.7
	1952	1,973.0	155.0	1.0	.0	.0	1.0	.0	122.0	32.0	1,818.0	3.0	1,815.0	670.0	1,145.0
Maine	1977	16,864.0	541.0	73.3	37.5	.0	35.8	.0	353.7	114.0	16,323.0	8,082.8	8,240.2	1,093.3	7,146.9
	1970	16,894.3	311.5	73.3	37.5	.0	35.8	.0	163.0	75.2	16,582.8	8,255.0	8,327.8	1,122.1	7,205.7
	1962	16,779.4	205.0	66.0	39.0	.0	27.0	.0	64.0	75.0	16,574.4	6,521.0	10,053.4	2,146.0	7,907.4
	1952	16,609.4	182.0	90.0	39.0	.0	51.0	.0	41.0	51.0	16,427.4	6,617.0	9,810.4	2,923.0	6,887.4
Massachusetts	1977	2,797.7	365.4	9.6	.0	.0	9.6	.0	240.1	115.7	2,432.3	30.1	2,402.2	253.6	2,148.6
	1970	2,846.3	399.0	29.0	.0	.0	29.0	.0	280.0	90.0	2,447.3	30.0	2,417.3	442.0	1,975.3
	1962	3,040.6	399.0	29.0	.0	.0	29.0	.0	280.0	90.0	2,641.6	30.0	2,611.6	602.0	2,009.6
	1952	3,259.0	399.0	29.0	.0	.0	29.0	.0	280.0	90.0	2,860.0	259.0	2,601.0	887.0	1,714.0
New Hampshire	1977	4,692.0	579.7	471.6	459.0	.0	12.6	.0	79.2	28.9	4,112.3	946.9	3,165.4	215.4	2,950.0
	1970	4,806.8	696.0	578.0	568.4	.0	9.6	.0	65.7	52.3	4,110.8	793.0	3,317.8	642.0	2,675.8
	1962	4,937.6	697.0	579.0	569.0	.0	10.0	.0	66.0	52.0	4,240.6	793.0	3,447.6	863.0	2,584.6
	1952	4,818.6	682.0	585.0	580.0	.0	5.0	.0	45.0	52.0	4,136.6	771.0	3,365.6	1,333.0	2,032.6
Rhode Island	1977	395.3	32.1	.0	.0	.0	.0	.0	20.1	12.0	363.2	.0	363.2	24.6	338.6
	1970	429.0	26.0	.0	.0	.0	.0	.0	13.0	13.0	403.0	.0	403.0	43.0	360.0
	1962	429.0	26.0	.0	.0	.0	.0	.0	13.0	13.0	403.0	.0	403.0	67.0	336.0
	1952	430.0	26.0	.0	.0	.0	.0	.0	13.0	13.0	404.0	.0	404.0	104.0	300.0
Vermont	1977	4,429.9	422.0	212.8	209.0	.0	3.8	.0	168.2	41.0	4,007.9	666.3	3,341.6	646.9	2,694.7
	1970	4,364.0	405.5	230.2	226.5	.0	3.7	.0	131.6	43.7	3,958.5	678.3	3,280.2	1,084.0	2,196.2
	1962	4,210.9	329.0	231.0	223.0	.0	8.0	.0	79.0	19.0	3,881.9	528.0	3,353.9	1,543.0	1,810.9
	1952	3,845.9	297.0	199.0	191.0	.0	8.0	.0	79.0	19.0	3,548.9	528.0	3,020.9	1,925.0	1,095.9
Total	1977	30,984.5	2,086.8	769.7	705.5	.0	64.2	.0	981.1	336.0	28,897.7	9,726.1	19,171.6	2,362.1	16,809.5
	1970	31,163.6	1,993.0	911.5	832.4	.0	79.1	.0	775.3	306.2	29,170.6	9,759.3	19,411.3	3,637.1	15,774.2
	1962	31,291.2	1,811.0	906.0	831.0	.0	75.0	.0	624.0	281.0	29,480.2	7,875.0	21,605.2	5,635.0	15,970.2
	1952	30,935.9	1,741.0	904.0	810.0	.0	94.0	.0	580.0	257.0	29,194.9	8,178.0	21,016.9	7,842.0	13,174.9
Middle Atlantic:															
Delaware	1977	384.4	14.0	.6	.0	.0	.6	.0	13.4	.0	370.4	29.7	340.7	178.1	162.6
	1970	390.0	9.0	1.0	.0	.0	1.0	.0	8.0	.0	381.0	29.7	351.3	142.0	209.3
	1962	391.0	9.0	1.0	.0	.0	1.0	.0	8.0	.0	382.0	24.7	357.3	172.0	185.3
	1952	392.0	13.0	1.0	.0	.0	1.0	.0	10.0	2.0	379.0	20.6	358.4	213.0	145.4
Maryland	1977	2,522.7	242.7	24.9	.0	.0	24.9	.0	185.2	32.6	2,280.0	139.2	2,140.8	1,028.2	1,112.6
	1970	2,673.6	189.3	13.9	.0	.0	13.9	.0	144.3	31.1	2,484.3	100.8	2,383.5	728.0	1,655.5
	1962	2,845.7	214.0	54.0	.0	.0	54.0	.0	128.0	32.0	2,631.7	57.0	2,574.7	956.0	1,618.7
	1952	2,854.7	214.0	54.0	.0	.0	54.0	.0	128.0	32.0	2,640.7	57.0	2,583.7	1,278.0	1,305.7
New Jersey	1977	1,856.8	318.9	27.7	.0	.0	27.7	.0	245.9	45.3	1,537.9	16.3	1,521.6	108.2	1,413.4
	1970	1,978.5	254.0	17.0	.0	.0	17.0	.0	237.0	.0	1,724.5	4.0	1,720.5	195.0	1,525.5
	1962	2,262.0	254.0	17.0	.0	.0	17.0	.0	237.0	.0	2,008.0	4.0	2,004.0	298.0	1,706.0
	1952	2,050.0	181.0	1.0	.0	.0	1.0	.0	130.0	50.0	1,869.0	4.0	1,865.0	443.0	1,422.0
New York	1977	14,243.3	892.0	57.5	.0	.0	57.5	.0	711.4	123.1	13,351.3	1,177.0	12,174.3	3,729.1	8,445.2
	1970	14,281.1	892.0	57.5	.0	.0	57.5	.0	711.4	123.1	13,389.1	1,180.3	12,208.8	3,739.7	8,469.1
	1962	13,417.2	895.0	98.0	.0	.0	98.0	.0	714.0	83.0	12,522.2	1,172.0	11,350.2	4,158.0	7,192.2
	1952	11,952.2	895.0	98.0	.0	.0	98.0	.0	714.0	83.0	11,057.2	1,172.0	9,885.2	4,987.0	4,898.2
Pennsylvania	1977	15,923.7	3,470.9	502.5	485.0	.0	17.5	.0	2,795.7	172.7	12,452.8	964.1	11,488.7	3,512.7	7,976.0
	1970	16,115.0	3,406.0	518.0	488.0	.0	30.0	.0	2,646.0	242.0	12,709.0	610.0	12,099.0	3,188.0	8,911.0
	1962	16,279.0	3,300.0	485.0	450.0	.0	35.0	.0	2,659.0	156.0	12,979.0	442.0	12,537.0	3,825.0	8,712.0
	1952	14,574.0	3,229.0	492.0	454.0	.0	38.0	.0	2,580.0	157.0	11,345.0	442.0	10,903.0	4,728.0	6,175.0
West Virginia	1977	11,483.7	1,120.8	891.7	852.6	.0	39.1	.0	228.9	.2	10,362.9	879.7	9,483.2	1,927.6	7,555.6
	1970	11,439.7	1,046.1	893.1	879.1	.0	14.0	.0	144.0	9.0	10,393.6	530.0	9,863.6	2,071.0	7,792.6
	1962	11,389.0	1,036.0	883.0	869.0	.0	14.0	.0	144.0	9.0	10,353.0	530.0	9,823.0	2,663.0	7,160.0
	1952	10,276.0	982.0	895.0	881.0	.0	14.0	.0	83.0	4.0	9,294.0	270.0	9,024.0	3,465.0	5,559.0
Total	1977	46,414.6	6,059.3	1,504.9	1,337.6	.0	167.3	.0	4,180.5	373.9	40,355.3	3,206.0	37,149.3	10,483.9	26,665.4
	1970	46,877.9	5,796.4	1,500.5	1,367.1	.0	133.4	.0	3,890.7	405.2	41,081.5	2,454.8	38,626.7	10,063.7	28,563.0
	1962	46,583.9	5,708.0	1,538.0	1,319.0	.0	219.0	.0	3,890.0	280.0	40,875.9	2,229.7	38,646.2	12,072.0	26,574.2
	1952	42,098.9	5,514.0	1,541.0	1,335.0	.0	206.0	.0	3,645.0	328.0	36,584.9	1,965.6	34,619.3	15,114.0	19,505.3

Table 3.4—*Area of commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977[1]—Cont'd.*

[Thousand acres]

Section, region and State	Year	All owner-ships	Public								Private				
			Total public	Federal				Indian	State	County and munic-ipal	Total private	Forest industry	Farmer and other private		
				Total Federal	National Forest	Bureau of Land Manage-ment	Other						Total	Farmer	Other
Lake States:															
Michigan	1977	18,778.2	6,419.1	2,454.5	2,401.0	8.4	45.1	17.9	3,838.0	108.7	12,359.1	2,256.7	10,102.4	3,429.7	6,672.7
	1970	18,800.0	6,440.9	2,476.3	2,422.8	8.4	45.1	17.9	3,838.0	108.7	12,359.1	2,256.7	10,102.4	3,429.7	6,672.7
	1962	19,121.0	6,310.0	2,509.0	2,410.0	9.0	90.0	21.0	3,695.0	85.0	12,811.0	1,548.0	11,263.0	3,841.0	7,422.0
	1952	19,121.0	6,310.0	2,509.0	2,410.0	9.0	90.0	21.0	3,695.0	85.0	12,811.0	1,548.0	11,263.0	3,841.0	7,422.0
Minnesota	1977	13,695.1	7,328.5	1,869.6	1,715.1	9.5	145.0	466.8	2,650.5	2,341.6	6,366.6	772.0	5,594.6	3,403.6	2,191.0
	1970	14,495.0	7,994.6	2,283.4	2,127.3	64.0	92.1	500.9	2,720.5	2,489.8	6,500.4	814.0	5,686.4	3,305.4	2,381.0
	1962	15,411.8	8,158.2	2,298.1	2,142.0	64.0	92.1	520.0	2,610.5	2,729.6	7,253.6	715.7	6,537.9	3,193.2	3,344.7
	1952	16,580.0	9,124.0	2,338.0	2,195.0	49.0	94.0	717.0	2,450.0	3,619.0	7,456.0	578.0	6,878.0	3,397.0	3,481.0
North Dakota	1977	405.0	123.7	52.5	.0	.0	52.5	61.2	10.0	.0	281.3	.0	281.3	161.8	119.5
	1970	406.0	124.7	53.5	.0	1.0	52.5	61.2	10.0	.0	281.3	.0	281.3	161.8	119.5
	1962	424.0	128.0	55.0	.0	1.0	54.0	63.0	10.0	.0	296.0	.0	296.0	173.0	123.0
	1952	451.0	138.9	57.0	.0	.5	56.5	71.4	10.5	.0	312.1	.0	312.1	182.1	130.0
South Dakota (East)	1977	223.0	77.3	6.3	.0	1.2	5.1	68.0	3.0	.0	145.7	.0	145.7	142.4	3.3
	1970	223.0	77.3	6.3	.0	1.2	5.1	68.0	3.0	.0	145.7	.0	145.7	142.4	3.3
	1962	230.0	77.6	6.5	.0	1.2	5.3	68.0	3.1	.0	152.4	.0	152.4	149.0	3.4
	1952	315.0	106.2	8.9	.0	1.7	7.2	93.1	4.2	.0	208.8	.0	208.8	204.1	4.7
Wisconsin	1977	14,478.0	4,686.5	1,383.4	1,266.0	.0	117.4	369.4	568.0	2,365.7	9,791.5	1,148.1	8,643.4	4,723.5	3,919.9
	1970	14,536.8	4,525.3	1,435.1	1,317.7	.0	117.4	156.5	568.0	2,365.7	10,011.5	1,368.1	8,643.4	4,723.5	3,919.9
	1962	14,693.3	4,882.0	1,487.0	1,372.0	5.0	110.0	423.0	541.0	2,431.0	9,811.3	933.0	8,878.3	5,853.3	3,025.0
	1952	15,348.6	5,099.0	1,624.0	1,357.0	5.0	262.0	379.0	444.0	2,652.0	10,249.6	942.0	9,307.6	6,252.6	3,055.0
Total	1977	47,579.3	18,635.1	5,766.3	5,382.1	19.1	365.1	983.3	7,069.5	4,816.0	28,944.2	4,176.8	24,767.4	11,861.0	12,906.4
	1970	48,460.8	19,162.8	6,254.6	5,867.8	74.6	312.2	804.5	7,139.5	4,964.2	29,298.0	4,438.8	24,859.2	11,762.8	13,096.4
	1962	49,880.1	19,555.8	6,355.6	5,924.0	80.2	351.4	1,095.0	6,859.6	5,245.6	30,324.3	3,196.7	27,127.6	13,209.5	13,918.1
	1952	51,815.6	20,778.1	6,536.9	5,962.0	65.2	509.7	1,281.5	6,603.7	6,356.0	31,037.5	3,068.0	27,969.5	13,876.8	14,092.7
Central:															
Illinois	1977	3,692.3	279.6	268.5	227.0	.0	41.5	.0	11.1	.0	3,412.7	16.7	3,396.0	2,107.5	1,288.5
	1970	3,680.0	267.3	256.2	214.7	.0	41.5	.0	11.1	.0	3,412.7	16.7	3,396.0	2,107.5	1,288.5
	1962	3,761.4	240.4	229.3	187.8	.0	41.5	.0	11.1	.0	3,521.0	16.7	3,504.3	2,216.0	1,288.3
	1952	3,830.0	226.0	216.0	184.0	.0	32.0	.0	10.0	.0	3,604.0	10.0	3,594.0	2,961.0	633.0
Indiana	1977	3,815.0	410.0	239.3	162.0	.0	77.3	.0	169.7	1.0	3,405.0	27.0	3,378.0	2,547.0	831.0
	1970	3,840.0	360.9	213.9	136.6	.0	77.3	.0	146.0	1.0	3,479.1	21.8	3,457.3	2,605.6	851.7
	1962	3,930.0	294.0	177.0	112.0	.0	65.0	.0	115.0	2.0	3,636.0	9.0	3,627.0	2,853.0	774.0
	1952	4,015.0	283.0	172.0	112.0	.0	60.0	.0	109.0	2.0	3,732.0	9.0	3,723.0	2,848.0	875.0
Iowa	1977	1,460.2	112.7	55.2	.0	.0	55.2	1.5	51.3	4.7	1,347.5	16.7	1,330.8	987.0	343.8
	1970	1,700.0	93.0	46.5	.0	.0	46.5	1.4	41.0	4.1	1,607.0	13.6	1,593.4	1,259.5	333.9
	1962	2,000.0	54.4	28.6	2.7	.0	25.9	1.0	22.0	2.8	1,945.6	6.3	1,939.3	1,654.9	284.4
	1952	2,595.0	36.8	11.9	2.7	.0	9.2	1.0	22.0	1.9	2,558.2	.0	2,558.2	2,282.1	276.1
Kansas	1977	1,187.0	36.5	26.6	.0	.0	26.6	.0	8.4	1.5	1,150.5	.0	1,150.5	798.5	352.0
	1970	1,187.0	36.5	26.6	.0	.0	26.6	.0	8.4	1.5	1,150.5	.0	1,150.5	798.5	352.0
	1962	1,194.0	36.5	26.6	.0	.0	26.6	.0	8.4	1.5	1,157.5	.0	1,157.5	805.0	352.5
	1952	1,208.0	26.9	26.9	.0	.0	26.9	.0	.0	.0	1,181.1	.0	1,181.1	821.4	359.7
Kentucky	1977	11,901.9	895.3	818.7	588.8	.0	229.9	.0	76.0	.6	11,006.6	255.1	10,751.5	5,489.0	5,262.5
	1970	11,826.0	820.3	738.3	531.0	.0	207.3	.0	76.8	5.2	11,005.7	227.9	10,777.8	5,882.0	4,895.8
	1962	11,651.3	652.0	575.0	438.0	.0	137.0	.0	77.0	.0	10,999.3	308.0	10,691.3	6,420.0	4,271.3
	1952	11,497.3	725.0	672.0	455.0	.0	217.0	.0	53.0	.0	10,772.3	308.0	10,464.3	7,226.0	3,238.3
Missouri	1977	12,288.6	1,531.9	1,312.9	1,246.0	.0	66.9	.0	186.8	32.2	10,756.7	362.3	10,394.4	6,136.8	4,257.6
	1970	12,500.0	1,600.0	1,384.8	1,321.6	.0	63.2	.0	184.7	30.5	10,900.0	343.1	10,556.9	6,440.5	4,116.4
	1962	13,500.0	1,570.8	1,362.2	1,311.0	.0	51.2	.0	183.9	24.7	11,929.2	280.3	11,648.9	7,926.1	3,722.8
	1952	14,300.0	1,617.0	1,461.0	1,339.0	1.0	121.0	.0	156.0	.0	12,683.0	460.0	12,223.0	7,734.0	4,489.0
Nebraska	1977	788.8	78.8	58.0	41.0	.0	17.0	9.3	11.0	.5	710.0	.0	710.0	604.2	105.8
	1970	933.0	94.9	74.1	57.1	.0	17.0	9.3	11.0	.5	838.1	.0	838.1	713.2	124.9
	1962	1,034.3	93.4	74.1	57.1	.0	17.0	7.8	11.0	.5	940.9	.0	940.9	802.3	138.6
	1952	1,050.4	62.2	45.0	28.0	.0	17.0	5.7	11.0	.5	988.2	.0	988.2	849.6	138.6

Table 3.4—*Area of commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977*[1]*—Cont'd.*

[Thousand acres]

Section, region and State	Year	All owner-ships	Public: Total public	Public: Federal: Total Federal	Public: Federal: National Forest	Public: Federal: Bureau of Land Manage-ment	Public: Federal: Other	Public: Indian	Public: State	Public: County and munic-ipal	Private: Total private	Private: Forest industry	Private: Farmer and other private: Total	Private: Farmer and other private: Farmer	Private: Farmer and other private: Other
Ohio	1977	6,028.8	386.6	149.7	141.0	.0	8.7	.0	195.3	41.6	5,642.2	126.8	5,515.4	2,616.0	2,899.4
	1970	6,422.0	365.1	138.4	129.7	.0	8.7	.0	222.7	4.0	6,056.9	126.8	5,930.1	2,616.0	3,314.1
	1962	6,041.0	360.0	88.0	88.0	.0	.0	.0	231.0	41.0	5,681.0	74.0	5,607.0	2,882.0	2,725.0
	1952	5,450.0	297.0	88.0	88.0	.0	.0	.0	168.0	41.0	5,153.0	30.0	5,123.0	3,512.0	1,611.0
Total	1977	41,162.6	3,731.4	2,928.9	2,405.8	.0	523.1	10.8	709.6	82.1	37,431.2	804.6	36,626.6	21,286.0	15,340.6
	1970	42,088.0	3,638.0	2,878.8	2,390.7	.0	488.1	10.7	701.7	46.8	38,450.0	749.9	37,700.1	22,422.8	15,277.3
	1962	43,112.0	3,301.5	2,560.8	2,196.6	.0	364.2	8.8	659.4	72.5	39,810.5	694.3	39,116.2	25,559.3	13,556.9
	1952	43,945.7	3,273.9	2,692.8	2,208.7	1.0	483.1	6.7	529.0	45.4	40,671.8	817.0	39,854.8	28,234.1	11,620.7
Total, North	1977	166,141.0	30,512.6	10,969.8	9,831.0	19.1	1,119.7	994.1	12,940.7	5,608.0	135,628.4	17,913.5	117,714.9	45,993.0	71,721.9
	1970	168,590.3	30,590.2	11,545.4	10,458.0	74.6	1,012.8	815.2	12,507.2	5,722.4	138,000.1	17,402.8	120,597.3	47,886.4	72,710.9
	1962	170,867.2	30,376.3	11,360.4	10,270.6	80.2	1,009.6	1,103.8	12,033.0	5,879.1	140,490.9	13,995.7	126,495.2	56,475.8	70,019.4
	1952	168,796.1	31,307.0	11,674.7	10,315.7	66.2	1,292.8	1,288.2	11,357.7	6,986.4	137,489.1	14,028.6	123,460.5	65,066.9	58,393.6
South Atlantic:															
North Carolina	1977	19,562.2	1,762.8	1,318.5	1,028.8	.0	289.7	46.0	320.4	77.9	17,799.4	2,134.8	15,664.6	8,452.4	7,212.2
	1970	20,192.9	1,751.0	1,308.5	1,035.6	.0	272.9	54.2	315.2	73.1	18,441.9	2,785.9	15,656.0	8,800.6	6,855.4
	1962	19,989.4	1,720.7	1,290.7	1,033.4	.0	257.3	56.8	307.4	65.8	18,268.7	2,495.2	15,773.5	9,503.1	6,270.4
	1952	19,582.4	1,591.8	1,251.1	1,019.6	.0	231.5	52.1	253.0	35.6	17,990.6	2,584.0	15,406.6	13,590.0	1,816.6
South Carolina	1977	12,176.1	1,095.1	862.4	572.8	.0	289.6	.0	205.8	26.9	11,081.0	2,006.9	9,074.1	4,354.2	4,719.9
	1970	12,410.7	1,073.2	840.5	550.9	.0	289.6	.0	205.8	26.9	11,337.5	2,047.4	9,290.1	4,995.6	4,294.5
	1962	12,170.4	1,033.5	857.5	563.5	.0	294.0	.0	153.0	23.0	11,136.9	2,009.6	9,127.3	5,637.0	3,490.3
	1952	11,883.8	954.6	801.6	562.6	.0	239.0	.0	128.0	25.0	10,929.2	1,650.2	9,279.0	7,530.0	1,749.0
Virginia	1977	15,938.8	1,922.0	1,669.1	1,424.0	.0	245.1	.5	183.4	69.0	14,016.8	1,669.6	12,347.2	6,209.9	6,137.3
	1970	15,859.4	1,671.9	1,436.7	1,202.8	.0	233.9	.5	181.6	53.1	14,187.5	1,634.3	12,553.2	6,701.4	5,851.8
	1962	15,752.1	1,535.3	1,394.8	1,202.8	.0	192.0	.5	88.0	52.0	14,216.8	1,454.3	12,762.5	8,000.7	4,761.8
	1952	15,496.5	1,492.8	1,355.0	1,198.0	.0	157.0	.0	86.0	51.8	14,003.7	1,094.7	12,909.0	10,817.5	2,091.5
Total	1977	47,677.1	4,779.9	3,850.0	3,025.6	.0	824.4	46.5	709.6	173.8	42,897.2	5,811.3	37,085.9	19,016.5	18,069.4
	1970	48,463.0	4,496.1	3,585.7	2,789.3	.0	796.4	54.7	702.6	153.1	43,966.9	6,467.6	37,499.3	20,497.6	17,001.7
	1962	47,911.9	4,289.5	3,543.0	2,799.7	.0	743.3	57.3	548.4	140.8	43,622.4	5,959.1	37,663.3	23,140.8	14,522.5
	1952	46,962.7	4,039.2	3,407.7	2,780.2	.0	627.5	52.1	467.0	112.4	42,923.5	5,328.9	37,594.6	31,937.5	5,657.1
East Gulf:															
Florida	1977	15,330.0	2,115.5	1,616.1	1,005.3	.2	610.6	7.0	466.3	26.1	13,214.5	5,318.6	7,895.9	2,595.7	5,300.2
	1970	16,231.6	2,145.5	1,644.5	1,035.3	.2	609.0	8.6	466.3	26.1	14,086.1	5,216.5	8,869.6	2,915.8	5,953.8
	1962	16,830.0	2,219.7	1,621.2	1,030.0	2.8	588.4	18.9	539.6	40.0	14,610.3	4,767.0	9,843.3	3,593.4	6,249.9
	1952	18,135.4	2,251.0	1,777.0	1,035.0	14.0	728.0	36.0	382.0	56.0	15,884.4	4,369.0	11,515.4	7,280.1	4,235.3
Georgia	1977	24,812.3	1,544.8	1,417.0	812.6	.0	604.4	.0	93.7	34.1	23,267.5	4,318.2	18,949.3	8,410.1	10,539.2
	1970	25,102.8	1,599.8	1,470.7	806.7	.0	664.0	.0	96.9	32.2	23,503.0	4,446.7	19,056.3	9,617.9	9,438.4
	1962	26,298.0	1,813.1	1,678.0	745.6	.0	932.4	.0	111.2	23.9	24,484.9	4,067.5	20,417.4	14,655.6	5,761.8
	1952	23,969.1	1,684.7	1,560.0	643.6	.0	916.4	.0	101.6	23.1	22,284.4	4,246.0	18,038.4	15,854.3	2,184.1
Total	1977	40,142.3	3,660.3	3,033.1	1,817.9	.2	1,215.0	7.0	560.0	60.2	36,482.0	9,636.8	26,845.2	11,005.8	15,839.4
	1970	41,334.4	3,745.3	3,115.2	1,842.0	.2	1,273.0	8.6	563.2	58.3	37,589.1	9,663.2	27,925.9	12,533.7	15,392.2
	1962	43,128.0	4,032.8	3,299.2	1,775.6	2.8	1,520.8	18.9	650.8	63.9	39,095.2	8,834.5	30,260.7	18,249.0	12,011.7
	1952	42,104.5	3,935.7	3,337.0	1,678.6	14.0	1,644.4	36.0	483.6	79.1	38,168.8	8,615.0	29,553.8	23,134.4	6,419.4
Central Gulf:															
Alabama	1977	21,333.1	1,008.8	799.8	617.8	.0	182.0	.0	155.6	53.4	20,324.3	4,204.9	16,119.4	6,732.5	9,386.9
	1970	21,742.2	997.5	795.2	625.8	2.7	166.7	.0	156.8	45.5	20,744.7	3,818.0	16,926.7	7,628.4	9,298.3
	1962	21,742.2	1,001.4	799.1	629.7	2.7	166.7	.0	156.8	45.5	20,740.8	3,818.0	16,922.8	7,631.7	9,291.1
	1952	20,756.0	968.0	791.0	616.0	10.0	165.0	.0	150.0	27.0	19,788.0	3,138.0	16,650.0	8,114.0	8,536.0
Mississippi	1977	16,504.3	1,676.4	1,202.2	1,122.0	.5	79.7	13.7	94.6	365.9	14,827.9	2,996.1	11,831.8	4,896.3	6,935.5
	1970	16,891.9	1,770.2	1,286.1	1,118.8	1.1	166.2	13.4	93.3	377.4	15,121.7	2,505.1	12,616.6	6,204.6	6,412.0
	1962	17,976.0	1,719.0	1,255.0	1,108.0	4.0	143.0	12.0	55.0	397.0	16,257.0	2,683.5	13,573.5	5,849.4	7,724.1
	1952	16,440.0	1,718.0	1,235.0	1,036.0	4.0	195.0	10.0	54.0	419.0	14,722.0	2,602.0	12,120.0	6,958.0	5,162.0
Tennessee	1977	12,819.8	1,265.2	919.0	578.7	.0	340.3	.0	324.0	22.2	11,554.6	1,121.4	10,433.2	5,079.1	5,354.1
	1970	12,819.8	1,286.2	940.0	599.7	.0	340.3	.0	324.0	22.2	11,533.6	1,121.4	10,412.2	5,079.1	5,333.1
	1962	13,643.0	1,199.0	834.0	591.0	.0	243.0	.0	344.0	21.0	12,444.0	946.0	11,498.0	5,745.0	5,753.0
	1952	12,301.0	1,172.0	833.0	566.0	.0	267.0	.0	329.0	10.0	11,129.0	750.0	10,379.0	6,126.0	4,253.0
Total	1977	50,657.2	3,950.4	2,921.0	2,318.5	.5	602.0	13.7	574.2	441.5	46,706.8	8,322.4	38,384.4	16,707.9	21,676.5
	1970	51,453.9	4,053.9	3,021.3	2,344.3	3.8	673.2	13.4	574.1	445.1	47,400.0	7,444.5	39,955.5	18,912.1	21,043.4
	1962	53,361.2	3,919.4	2,888.1	2,328.7	6.7	552.7	12.0	555.8	463.5	49,441.8	7,447.5	41,994.3	19,226.1	22,768.2
	1952	49,497.0	3,858.0	2,859.0	2,218.0	14.0	627.0	10.0	533.0	456.0	45,639.0	6,490.0	39,149.0	21,198.0	17,951.0

Table 3.4—*Area of commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977*[1]*—Cont'd.*

[Thousand acres]

Section, region and State	Year	All owner-ships	Public									Private				
				Federal										Farmer and other private		
			Total public	Total Federal	National Forest	Bureau of Land Manage-ment	Other	Indian	State	County and munic-ipal		Total private	Forest industry	Total	Farmer	Other
West Gulf:																
Arkansas	1977	18,206.7	2,974.0	2,717.6	2,413.7	1.1	302.8	.0	236.9	19.5		15,232.7	3,950.7	11,282.0	4,800.0	6,482.0
	1970	18,206.7	2,938.5	2,682.1	2,378.2	1.1	302.8	.0	236.9	19.5		15,268.2	3,950.7	11,317.5	4,800.0	6,517.5
	1962	21,500.1	2,846.0	2,641.0	2,373.0	3.0	265.0	.0	194.0	11.0		18,654.1	4,028.0	14,626.1	5,613.0	9,013.1
	1952	19,265.1	2,910.0	2,802.0	2,326.0	122.0	354.0	.0	106.0	2.0		16,355.1	4,118.0	12,237.1	6,733.0	5,504.1
Louisiana	1977	14,526.6	1,002.1	693.6	559.6	1.3	132.7	.0	298.7	9.8		13,524.5	3,761.4	9,763.1	2,096.8	7,666.3
	1970	15,342.3	860.1	692.4	551.7	6.0	134.7	.0	163.6	4.1		14,482.2	3,180.8	11,301.4	2,284.0	9,017.4
	1962	16,512.0	885.0	704.0	575.0	11.0	118.0	.0	176.0	5.0		15,627.0	3,084.8	12,542.2	2,813.6	9,728.6
	1952	16,038.0	848.0	667.0	536.0	4.0	127.0	.0	176.0	5.0		15,190.0	3,452.0	11,738.0	3,189.0	8,549.0
Oklahoma	1977	4,323.4	568.2	348.2	224.4	.0	123.8	114.7	90.8	14.5		3,755.2	991.3	2,763.9	1,095.5	1,668.4
	1970	4,817.4	577.3	345.0	233.4	.0	111.6	136.6	86.4	9.3		4,240.1	868.7	3,371.4	1,411.6	1,959.8
	1962	4,711.1	451.3	251.3	219.0	3.0	29.3	140.0	60.0	.0		4,259.8	969.0	3,290.8	1,134.8	2,156.0
	1952	5,044.1	448.3	248.3	212.0	7.0	29.3	140.0	60.0	.0		4,595.8	929.0	3,666.8	1,586.8	2,080.0
Texas	1977	12,512.5	795.7	736.8	595.0	.0	141.8	3.0	48.5	7.4		11,716.8	3,771.1	7,945.7	1,186.6	6,759.1
	1970	12,924.3	828.4	775.1	625.2	.0	149.9	3.7	42.9	6.7		12,095.9	3,496.5	8,599.4	2,403.9	6,195.5
	1962	12,781.3	753.0	718.0	618.0	.0	100.0	1.0	32.0	2.0		12,028.3	3,128.0	8,900.3	2,787.8	6,112.5
	1952	13,171.5	767.0	732.0	655.0	.0	77.0	4.0	29.0	2.0		12,404.5	3,123.0	9,281.5	3,533.2	5,748.3
Total	1977	49,569.2	5,340.0	4,496.2	3,792.7	2.4	701.1	117.7	674.9	51.2		44,229.2	12,474.5	31,754.7	9,178.9	22,575.8
	1970	51,290.7	5,204.3	4,494.6	3,788.5	7.1	699.0	140.3	529.8	39.6		46,086.4	11,496.7	34,589.7	10,899.5	- 23,690.2
	1962	55,504.5	4,935.3	4,314.3	3,785.0	17.0	512.3	141.0	462.0	18.0		50,569.2	11,209.8	39,359.4	12,349.2	27,010.2
	1952	53,518.7	4,973.3	4,449.3	3,729.0	133.0	587.3	144.0	371.0	9.0		48,545.4	11,622.0	36,923.4	15,042.0	21,881.4
Total, South	1977	188,045.8	17,730.6	14,300.3	10,954.7	3.1	3,342.5	184.9	2,518.7	726.7		170,315.2	36,245.0	134,070.2	55,909.1	78,161.1
	1970	192,542.0	17,499.6	14,216.8	10,764.1	11.1	3,441.6	217.0	2,369.7	696.1		175,042.4	35,072.0	139,970.4	62,842.9	77,127.5
	1962	199,905.6	17,177.0	14,044.6	10,689.0	26.5	3,329.1	229.2	2,217.0	686.2		182,728.6	33,450.9	149,277.7	72,965.1	76,312.6
	1952	192,082.9	16,806.2	14,053.0	10,405.8	161.0	3,486.2	242.1	1,854.6	656.5		175,276.7	32,055.9	143,220.8	91,311.9	51,908.9
Pacific Northwest:																
Alaska:																
Coastal	1977	7,040.2	6,954.8	6,610.4	6,528.7	77.7	4.0	22.0	322.4	.0		85.4	.2	85.2	.0	85.2
	1970	7,303.8	7,273.6	6,895.6	6,794.0	97.6	4.0	25.0	353.0	.0		30.2	.2	30.0	.0	30.0
	1962	7,330.2	7,300.0	7,097.0	6,828.2	264.8	4.0	25.0	178.0	.0		30.2	2	30.0	.0	30.0
	1952	7,359.5	7,329.5	7,304.5	6,873.0	427.5	4.0	25.0	.0	.0		30.0	.0	30.0	.0	30.0
Interior	1977	4,109.9	3,906.5	1,706.4	.0	1,584.6	121.8	84.6	2,005.9	109.6		203.4	.0	203.4	.0	203.4
	1970	4,109.9	3,906.5	1,706.4	.0	1,584.6	121.8	84.6	2,005.9	109.6		203.4	.0	203.4	.0	203.4
	1962	4,109.9	3,906.5	3,821.9	.0	3,700.1	121.8	84.6	.0	.0		203.4	.0	203.4	.0	203.4
	1952	4,109.9	3,906.5	3,821.9	.0	3,700.1	121.8	84.6	.0	.0		203.4	.0	203.4	.0	203.4
Summary	1977	11,150.1	10,861.3	8,316.8	6,528.7	1,662.3	125.8	106.6	2,328.3	109.6		288.8	.2	288.6	.0	288.6
	1970	11,413.7	11,180.1	8,602.0	6,794.0	1,682.2	125.8	109.6	2,358.9	109.6		233.6	.2	233.4	.0	233.4
	1962	11,440.1	11,206.5	10,918.9	6,828.2	3,964.9	125.8	109.6	178.0	.0		233.6	.2	233.4	.0	233.4
	1952	11,469.4	11,236.0	11,126.4	6,873.0	4,127.6	125.8	109.6	.0	.0		233.4	.0	233.4	.0	233.4
Oregon:																
Western	1977	13,651.0	7,445.0	6,584.0	4,587.0	1,996.0	1.0	7.0	752.0	102.0		6,206.0	3,895.0	2,311.0	1,077.0	1,234.0
	1970	14,607.0	7,749.0	6,876.0	4,830.0	2,046.0	.0	8.0	735.0	130.0		6,858.0	3,624.0	3,234.0	1,612.0	1,622.0
	1962	14,719.0	7,817.0	6,941.0	4,857.0	2,084.0	.0	8.0	733.0	135.0		6,902.0	3,548.0	3,354.0	1,674.0	1,680.0
	1952	14,601.0	7,730.0	6,726.0	4,576.0	2,150.0	.0	22.0	732.0	250.0		6,871.0	3,128.0	3,743.0	1,872.0	1,871.0
Eastern	1977	10,560.0	7,682.0	7,233.0	7,046.0	182.0	5.0	377.0	68.0	4.0		2,878.0	1,627.0	1,251.0	1,024.0	227.0
	1970	10,722.0	7,715.0	7,338.0	7,173.0	160.0	5.0	310.0	63.0	4.0		3,007.0	1,628.0	1,379.0	1,016.0	363.0
	1962	10,904.0	7,741.0	7,355.0	7,208.0	140.0	7.0	317.0	64.0	5.0		3,163.0	1,540.0	1,623.0	1,236.0	387.0
	1952	11,087.0	8,065.0	6,928.0	6,720.0	200.0	8.0	1,067.0	65.0	5.0		3,022.0	1,533.0	1,489.0	1,238.0	251.0
Summary	1977	24,211.0	15,127.0	13,817.0	11,633.0	2,178.0	6.0	384.0	820.0	106.0		9,084.0	5,522.0	3,562.0	2,101.0	1,461.0
	1970	25,329.0	15,464.0	14,214.0	12,003.0	2,206.0	5.0	318.0	798.0	134.0		9,865.0	5,252.0	4,613.0	2,628.0	1,985.0
	1962	25,623.0	15,558.0	14,296.0	12,065.0	2,224.0	7.0	325.0	797.0	140.0		10,065.0	5,088.0	4,977.0	2,910.0	2,067.0
	1952	25,688.0	15,795.0	13,654.0	11,296.0	2,350.0	8.0	1,089.0	797.0	255.0		9,893.0	4,661.0	5,232.0	3,110.0	2,122.0

Table 3.4—*Area of commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977*[1]*—Cont'd.*

[Thousand acres]

Section, region and State	Year	All ownerships	Public: Total public	Public: Federal: Total Federal	Public: Federal: National Forest	Public: Federal: Bureau of Land Management	Public: Federal: Other	Public: Indian	Public: State	Public: County and municipal	Private: Total private	Private: Forest industry	Private: Farmer and other private: Total	Private: Farmer and other private: Farmer	Private: Farmer and other private: Other
Washington:															
Western	1977	9,788.0	3,991.0	2,270.0	2,200.0	2.0	68.0	187.0	1,358.0	176.0	5,797.0	3,581.0	2,216.0	434.0	1,782.0
	1970	9,991.0	4,123.0	2,391.0	2,321.0	2.0	68.0	190.0	1,379.0	163.0	5,868.0	3,598.0	2,270.0	437.0	1,833.0
	1962	10,352.0	4,250.0	2,469.0	2,398.0	2.0	69.0	193.0	1,410.0	178.0	6,102.0	3,686.0	2,416.0	505.0	1,911.0
	1952	10,628.0	4,349.0	2,502.0	2,398.0	26.0	78.0	199.0	1,442.0	206.0	6,279.0	3,748.0	2,531.0	537.0	1,994.0
Eastern	1977	8,134.0	5,203.0	3,112.0	2,967.0	45.0	100.0	1,359.0	726.0	6.0	2,931.0	738.0	2,193.0	1,383.0	810.0
	1970	8,410.0	5,395.0	3,249.0	3,103.0	46.0	100.0	1,403.0	737.0	6.0	3,015.0	750.0	2,265.0	1,429.0	836.0
	1962	8,508.0	5,500.0	3,360.0	3,196.0	91.0	73.0	1,439.0	690.0	11.0	3,008.0	652.0	2,356.0	1,697.0	659.0
	1952	8,560.0	5,537.0	3,380.0	3,197.0	148.0	35.0	1,496.0	653.0	8.0	3,023.0	637.0	2,386.0	1,759.0	627.0
Summary	1977	17,922.0	9,194.0	5,382.0	5,167.0	47.0	168.0	1,546.0	2,084.0	182.0	8,728.0	4,319.0	4,409.0	1,817.0	2,592.0
	1970	18,401.0	9,518.0	5,640.0	5,424.0	48.0	168.0	1,593.0	2,116.0	169.0	8,883.0	4,348.0	4,535.0	1,866.0	2,669.0
	1962	18,860.0	9,750.0	5,829.0	5,594.0	93.0	142.0	1,632.0	2,100.0	189.0	9,110.0	4,338.0	4,772.0	2,202.0	2,570.0
	1952	19,188.0	9,886.0	5,882.0	5,595.0	174.0	113.0	1,695.0	2,095.0	214.0	9,302.0	4,385.0	4,917.0	2,296.0	2,621.0
Total	1977	53,283.1	35,182.3	27,515.8	23,328.7	3,887.3	299.8	2,036.6	5,232.3	397.6	18,100.8	9,841.2	8,259.6	3,918.0	4,341.6
	1970	55,143.7	36,162.1	28,456.0	24,221.0	3,936.2	298.8	2,020.6	5,272.9	412.6	18,981.6	9,600.2	9,381.4	4,494.0	4,887.4
	1962	55,923.1	36,514.5	31,043.9	24,487.2	6,281.9	274.8	2,066.6	3,075.0	329.0	19,408.6	9,426.2	9,982.4	5,112.0	4,870.4
	1952	56,345.4	36,917.0	30,662.4	23,764.0	6,651.6	246.8	2,893.6	2,892.0	469.0	19,428.4	9,046.0	10,382.4	5,406.0	4,976.4
Pacific Southwest:															
California	1977	16,303.0	8,675.0	8,434.0	8,168.0	226.0	40.0	135.0	79.0	27.0	7,628.0	2,687.0	4,941.0	1,646.0	3,295.0
	1970	17,081.0	9,448.0	9,236.0	8,953.0	244.0	39.0	109.0	79.0	24.0	7,633.0	2,671.0	4,962.0	1,650.0	3,312.0
	1962	17,198.0	9,430.0	9,244.0	8,918.0	286.0	40.0	114.0	67.0	5.0	7,768.0	2,445.0	5,323.0	1,517.0	3,806.0
	1952	17,127.0	9,075.0	8,730.0	8,372.0	318.0	40.0	144.0	193.0	8.0	8,052.0	2,167.0	5,885.0	1,664.0	4,221.0
Hawaii	1977	948.0	454.0	12.0	.0	.0	12.0	.0	442.0	.0	494.0	.0	494.0	.0	494.0
	1970	948.0	454.0	12.0	.0	.0	12.0	.0	442.0	.0	494.0	.0	494.0	.0	494.0
	1962	1,089.0	496.0	9.0	.0	.0	9.0	.0	487.0	.0	593.0	.0	593.0	366.0	227.0
	1952	1,089.0	496.0	9.0	.0	.0	9.0	.0	487.0	.0	593.0	.0	593.0	366.0	227.0
Total	1977	17,251.0	9,129.0	8,446.0	8,168.0	226.0	52.0	135.0	521.0	27.0	8,122.0	2,687.0	5,435.0	1,646.0	3,789.0
	1970	18,029.0	9,902.0	9,248.0	8,953.0	244.0	51.0	109.0	521.0	24.0	8,127.0	2,671.0	5,456.0	1,650.0	3,806.0
	1962	18,287.0	9,926.0	9,253.0	8,918.0	286.0	49.0	114.0	554.0	5.0	8,361.0	2,445.0	5,916.0	1,883.0	4,033.0
	1952	18,216.0	9,571.0	8,739.0	8,372.0	318.0	49.0	144.0	680.0	8.0	8,645.0	2,167.0	6,478.0	2,030.0	4,448.0
Total, Pacific Coast	1977	70,534.1	44,311.3	35,961.8	31,496.7	4,113.3	351.8	2,171.6	5,753.3	424.6	26,222.8	12,528.2	13,694.6	5,564.0	8,130.6
	1970	73,172.7	46,064.1	37,704.0	33,174.0	4,180.2	349.8	2,129.6	5,793.9	436.6	27,108.6	12,271.2	14,837.4	6,144.0	8,693.4
	1962	74,210.1	46,440.5	40,296.9	33,405.2	6,567.9	323.8	2,180.6	3,629.0	334.0	27,769.6	11,871.2	15,898.4	6,995.0	8,903.4
	1952	74,561.4	46,488.0	39,401.4	32,136.0	6,969.6	295.8	3,037.6	3,572.0	477.0	28,073.4	11,213.0	16,860.4	7,436.0	9,424.4
Northern, Rocky Mtn.:															
Idaho	1977	13,540.6	10,519.8	9,569.9	9,153.2	409.0	7.7	70.0	861.0	18.9	3,020.8	946.7	2,074.1	777.1	1,297.0
	1970	15,192.4	12,171.6	11,240.2	10,731.3	501.2	7.7	51.5	861.0	18.9	3,020.8	946.7	2,074.1	777.1	1,297.0
	1962	15,725.1	12,695.1	11,760.8	11,250.5	502.6	7.7	51.8	863.6	18.9	3,030.0	949.5	2,080.5	779.4	1,301.1
	1952	15,539.9	12,496.8	11,558.4	11,045.9	504.8	7.7	52.0	867.4	19.0	3,043.1	953.6	2,089.5	782.8	1,306.7
Montana	1977	14,359.4	9,794.0	8,634.9	8,161.8	420.0	53.1	624.9	529.5	4.7	4,565.4	1,055.4	3,510.0	1,952.4	1,557.6
	1970	15,983.4	11,418.0	10,263.6	9,732.5	478.0	53.1	620.2	529.5	4.7	4,565.4	1,055.4	3,510.0	1,952.4	1,557.6
	1962	16,829.9	12,250.6	11,092.9	10,560.0	479.5	53.4	621.9	531.1	4.7	4,579.3	1,058.5	3,520.8	1,958.3	1,562.5
	1952	16,753.2	12,154.2	10,991.5	10,456.3	481.6	53.6	624.7	533.3	4.7	4,599.0	1,063.1	3,535.9	1,966.8	1,569.1
South Dakota (West)	1977	1,244.1	1,028.7	958.3	952.5	4.8	1.0	.0	67.0	3.4	215.4	16.1	199.3	154.6	44.7
	1970	1,310.4	1,029.4	967.2	957.6	5.6	4.0	.0	62.2	.0	281.0	17.2	263.8	222.8	41.0
	1962	1,310.9	1,029.0	966.6	957.0	5.6	4.0	.0	62.4	.0	281.9	17.2	264.7	223.6	41.1
	1952	1,306.4	1,023.4	960.7	951.0	5.6	4.1	.0	62.7	.0	283.0	17.3	265.7	224.4	41.3
Wyoming	1977	4,334.2	3,479.1	3,244.7	3,044.7	200.0	.0	123.8	110.6	.0	855.1	54.3	800.8	619.8	181.0
	1970	4,649.8	3,794.7	3,560.3	3,166.5	393.8	.0	123.8	110.6	.0	855.1	54.3	800.8	619.8	181.0
	1962	4,720.6	3,862.9	3,627.7	3,232.8	394.9	.0	124.2	111.0	.0	857.7	54.5	803.2	621.7	181.5
	1952	4,738.0	3,876.7	3,640.5	3,243.8	396.7	.0	124.7	111.5	.0	861.3	54.7	806.6	624.3	182.3
Total	1977	33,478.3	24,821.6	22,407.8	21,312.2	1,033.8	61.8	818.7	1,568.1	27.0	8,656.7	2,072.5	6,584.2	3,503.9	3,080.3
	1970	37,136.0	28,413.7	26,031.3	24,587.9	1,378.6	64.8	795.5	1,563.3	23.6	8,722.3	2,073.6	6,648.7	3,572.1	3,076.6
	1962	38,586.5	29,837.6	27,448.0	26,000.3	1,382.6	65.1	797.9	1,568.1	23.6	8,748.9	2,079.7	6,669.2	3,583.0	3,086.2
	1952	38,337.5	29,551.1	27,151.1	25,697.0	1,388.7	65.4	801.4	1,574.9	23.7	8,786.4	2,088.7	6,697.7	3,598.3	3,099.4

Table 3.4—*Area of commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977*[1]*—Cont'd.*

[Thousand acres]

Section, region and State	Year	All ownerships	Public								Private				
				Federal									Farmer and other private		
			Total public	Total Federal	National Forest	Bureau of Land Management	Other	Indian	State	County and municipal	Total private	Forest industry	Total	Farmer	Other
Southern Rocky Mtn.:															
Arizona	1977	3,895.6	3,729.3	2,479.5	2,461.5	18.0	.0	1,216.2	32.1	1.5	166.3	.0	166.3	81.8	84.5
	1970	3,689.9	3,523.6	2,349.8	2,347.8	2.0	.0	1,140.2	32.1	1.5	166.3	.0	166.3	81.8	84.5
	1962	3,692.7	3,525.9	2,348.6	2,346.6	2.0	.0	1,143.6	32.2	1.5	166.8	.0	166.8	82.0	84.8
	1952	3,620.6	3,453.1	2,270.7	2,268.7	2.0	.0	1,148.5	32.4	1.5	167.5	.0	167.5	82.4	85.1
Colorado	1977	11,314.7	8,196.3	7,932.5	7,505.8	422.1	4.6	29.8	188.9	45.1	3,118.4	14.7	3,103.7	2,635.9	467.8
	1970	11,583.7	8,465.3	8,128.5	7,710.8	413.1	4.6	102.8	188.9	45.1	3,118.4	14.7	3,103.7	2,635.9	467.8
	1962	12,358.5	9,230.6	8,892.9	8,473.9	414.4	4.6	103.1	189.4	45.2	3,127.9	14.7	3,113.2	2,643.9	469.3
	1952	12,282.9	9,141.6	8,802.4	8,381.5	416.2	4.7	103.5	190.3	45.4	3,141.3	14.8	3,126.5	2,655.3	471.2
Nevada	1977	134.3	65.7	61.1	61.1	.0	.0	.0	3.4	1.2	68.6	8.3	60.3	1.8	58.5
	1970	128.6	60.0	55.4	55.4	.0	.0	.0	3.4	1.2	68.6	8.3	60.3	1.8	58.5
	1962	141.7	72.9	68.3	68.3	.0	.0	.0	3.4	1.2	68.8	8.3	60.5	1.8	58.7
	1952	142.0	72.9	68.3	68.3	.0	.0	.0	3.4	1.2	69.1	8.4	60.7	1.8	58.9
New Mexico	1977	5,537.5	3,610.4	2,866.6	2,818.3	39.4	8.9	572.7	171.1	.0	1,927.1	.0	1,927.1	1,549.8	377.3
	1970	5,736.4	3,809.3	3,024.5	2,939.2	76.4	8.9	613.7	171.1	.0	1,927.1	137.1	1,790.0	1,549.8	240.2
	1962	5,746.4	3,813.5	3,026.2	2,940.7	76.6	8.9	615.7	171.6	.0	1,932.9	137.5	1,795.4	1,554.5	240.9
	1952	5,626.6	3,685.3	2,894.6	2,808.8	76.9	8.9	618.3	172.4	.0	1,941.3	138.1	1,803.2	1,561.2	242.0
Utah	1977	3,404.6	2,743.8	2,431.0	2,277.0	154.0	.0	73.8	239.0	.0	660.8	.0	660.8	537.8	123.0
	1970	3,824.6	3,163.8	2,767.6	2,613.6	154.0	.0	157.2	239.0	.0	660.8	.0	660.8	537.8	123.0
	1962	3,871.5	3,208.7	2,811.3	2,656.8	154.5	.0	157.6	239.8	.0	662.8	.0	662.8	539.4	123.4
	1952	3,881.9	3,216.2	2,817.1	2,662.0	155.1	.0	158.3	240.8	.0	665.7	.0	665.7	541.8	123.9
Total	1977	24,286.7	18,345.5	15,770.7	15,123.7	633.5	13.5	1,892.5	634.5	47.8	5,941.2	23.0	5,918.2	4,807.1	1,111.1
	1970	24,963.2	19,022.0	16,325.8	15,666.8	645.5	13.5	2,013.9	634.5	47.8	5,941.2	160.1	5,781.1	4,807.1	974.0
	1962	25,810.8	19,851.6	17,147.3	16,486.3	647.5	13.5	2,020.0	636.4	47.9	5,959.2	160.5	5,798.7	4,821.6	977.1
	1952	25,554.0	19,569.1	16,853.1	16,189.3	650.2	13.6	2,028.6	639.3	48.1	5,984.9	161.3	5,823.6	4,842.5	981.1
Total, Rocky Mtn.	1977	57,765.0	43,167.1	38,178.5	36,435.9	1,667.3	75.3	2,711.2	2,202.6	74.8	14,597.9	2,095.5	12,502.4	8,311.0	4,191.4
	1970	62,099.2	47,435.7	42,357.1	40,254.7	2,024.1	78.3	2,809.4	2,197.8	71.4	14,663.5	2,233.7	12,429.8	8,379.2	4,050.6
	1962	64,397.3	49,689.2	44,595.3	42,486.6	2,030.1	78.6	2,817.9	2,204.5	71.5	14,708.1	2,240.2	12,467.9	8,404.6	4,063.3
	1952	63,891.5	49,120.2	44,004.2	41,886.3	2,038.9	79.0	2,830.0	2,214.2	71.8	14,771.3	2,250.0	12,521.3	8,440.8	4,080.5
Total, all regions	1977	482,485.9	135,721.6	99,410.4	88,718.3	5,802.8	4,889.3	6,061.8	23,415.3	6,834.1	346,764.3	68,782.2	277,982.1	115,777.1	162,205.0
	1970	496,404.1	141,589.6	105,823.3	94,650.8	6,290.0	4,882.5	5,971.2	22,868.6	6,926.5	354,814.6	66,979.7	287,834.9	125,252.5	162,582.4
	1962	509,380.1	143,683.0	110,297.2	96,851.4	8,704.7	4,741.1	6,331.5	20,083.5	6,970.8	365,697.2	61,558.0	304,139.2	144,840.5	159,298.7
	1952	499,331.9	143,721.4	109,133.3	94,743.8	9,235.7	5,153.8	7,397.9	18,998.5	8,191.7	355,610.5	59,547.5	296,063.0	172,255.6	123,807.4

[1]Data for 1952 and 1962 are as of December 31. Data for 1970 and 1977 are as of January 1.

Table 3.5—*Area of commercial timberland in the eastern United States, by ownership, forest type, productivity class, section, and region, January 1, 1977*

[Thousand acres]

Section, region and productivity class	All ownerships											
	Total	White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked
New England:												
120 +	3,544.2	573.6	1,543.6	.0	.0	47.3	47.6	.0	389.5	669.8	231.8	41.0
85 to 120	7,979.9	1,269.3	3,098.2	.0	7.2	138.1	291.0	.0	1,061.5	1,536.5	558.6	19.5
50 to 85	10,797.9	1,891.0	2,806.9	.0	65.9	244.7	738.6	.0	1,428.4	2,728.2	774.5	119.7
20 to 50	8,662.5	871.7	1,893.2	.0	69.5	274.9	1,068.9	.0	1,332.6	2,643.4	408.7	99.6
Total	30,984.5	4,605.6	9,341.9	.0	142.6	705.0	2,146.1	.0	4,212.0	7,577.9	1,973.6	279.8
Middle Atlantic:												
120 +	3,051.8	342.8	212.2	.0	175.7	85.7	934.2	18.8	257.3	945.4	38.7	41.0
85 to 120	10,117.1	531.9	186.5	.0	441.4	231.6	3,505.9	47.9	1,051.8	3,711.3	252.1	156.7
50 to 85	19,438.4	1,107.1	262.2	.0	670.1	556.9	7,128.9	121.1	1,952.1	6,220.0	783.7	636.3
20 to 50	13,807.3	721.6	233.7	.0	569.7	493.2	4,881.3	62.5	1,746.4	3,748.7	466.6	883.6
Total	46,414.6	2,703.4	894.6	.0	1,856.9	1,367.4	16,450.3	250.3	5,007.6	14,625.4	1,541.1	1,717.6
Lake States:												
120 +	581.9	128.6	329.3	.0	.0	.0	8.8	.0	12.9	15.3	78.5	8.5
85 to 120	5,067.4	583.4	948.9	.0	.0	.0	95.2	.0	61.4	436.2	2,909.3	33.0
50 to 85	16,926.3	1,422.9	1,476.9	.0	.0	.0	1,547.8	.0	843.2	2,951.6	8,414.9	269.0
20 to 50	25,003.7	1,790.5	4,542.8	.0	.0	.0	4,084.4	.0	2,965.6	6,585.6	4,240.0	794.8
Total	47,579.3	3,925.4	7,297.9	.0	.0	.0	5,736.2	.0	3,883.1	9,988.7	15,642.7	1,105.3
Central States:												
120 +	1,999.7	2.9	2.8	.0	148.0	76.0	890.1	25.2	651.3	190.9	.0	12.5
85 to 120	5,767.4	31.9	.9	.0	410.5	441.4	2,774.8	101.4	1,245.2	697.6	14.9	48.8
50 to 85	15,361.5	53.8	10.7	.0	486.4	635.1	9,408.3	146.5	2,576.1	1,684.5	45.9	314.2
20 to 50	18,034.0	132.3	3.8	.0	378.5	944.9	12,550.2	99.8	1,499.1	1,056.3	24.5	1,344.6
Total	41,162.6	220.9	18.2	.0	1,423.4	2,097.4	25,623.4	372.9	5,971.7	3,629.3	85.3	1,720.1
Total, North:												
120 +	9,177.6	1,047.9	2,087.9	.0	323.7	209.0	1,880.7	44.0	1,311.0	1,821.4	349.0	103.0
85 to 120	28,931.8	2,416.5	4,234.5	.0	859.1	811.1	6,666.9	149.3	3,419.9	6,381.6	3,734.9	258.0
50 to 85	62,524.1	4,474.8	4,556.7	.0	1,222.4	1,436.7	18,823.6	267.6	6,799.8	13,584.3	10,019.0	1,339.2
20 to 50	65,507.5	3,516.1	6,673.5	.0	1,017.7	1,713.0	22,584.8	162.3	7,543.7	14,034.0	5,139.8	3,122.6
Total	166,141.0	11,455.3	17,552.6	.0	3,422.9	4,169.8	49,956.0	623.2	19,074.4	35,821.3	19,242.7	4,822.8
South Atlantic:												
120 +	832.6	118.9	.0	.0	235.3	143.4	222.3	84.5	20.1	.0	.0	8.1
85 to 120	7,082.2	46.7	.0	86.2	2,127.6	927.3	2,248.6	1,145.0	382.5	66.4	.0	51.9
50 to 85	30,195.2	124.1	.0	813.4	8,938.3	4,090.1	12,557.1	2,527.0	551.7	237.6	.0	355.9
20 to 50	9,567.1	11.2	7.9	678.8	2,329.0	1,302.2	3,925.7	488.8	72.9	36.3	.0	714.3
Total	47,677.1	300.9	7.9	1,578.4	13,630.2	6,463.0	18,953.7	4,245.3	1,027.2	340.3	.0	1,130.2
East Gulf:												
120 +	829.2	30.2	.0	94.4	256.8	174.0	149.8	90.4	29.4	.0	.0	4.2
85 to 120	8,207.4	.3	.0	2,419.6	2,239.3	1,136.5	1,163.2	940.9	193.5	.0	.0	114.1
50 to 85	25,645.0	.0	.0	7,615.8	4,898.0	3,550.5	3,864.7	4,038.4	399.2	.0	.0	1,278.4
20 to 50	5,460.7	.0	.0	1,277.1	588.8	623.3	533.2	797.2	8.4	.0	.0	1,632.7
Total	40,142.3	30.5	.0	11,406.9	7,982.9	5,484.3	5,710.9	5,866.9	630.5	.0	.0	3,029.4
Central Gulf:												
120 +	6,342.9	.0	.0	167.8	1,899.4	1,442.9	1,158.5	1,430.0	207.1	.0	.0	37.2
85 to 120	18,643.6	11.2	.0	879.1	4,966.7	3,669.6	5,597.6	3,235.6	171.7	22.5	.0	89.6
50 to 85	20,550.6	21.9	.0	1,228.3	4,475.2	4,142.4	9,050.1	1,380.6	89.1	50.5	.0	112.5
20 to 50	5,120.1	5.8	.0	253.6	570.3	789.2	3,289.2	143.3	.0	11.4	.0	57.3
Total	50,657.2	38.9	.0	2,528.8	11,911.6	10,044.1	19,095.4	6,189.5	467.9	84.4	.0	296.6
West Gulf:												
120 +	4,676.7	.0	.0	62.2	1,462.6	866.5	514.6	1,347.5	389.0	.0	.0	34.3
85 to 120	13,966.7	.0	.0	440.6	4,937.7	2,931.3	2,045.6	3,297.7	251.9	.0	.0	61.9
50 to 85	21,910.8	.0	.0	624.5	5,869.5	3,823.7	6,278.9	4,626.1	384.8	.0	.0	303.3
20 to 50	9,015.0	.0	.0	113.3	781.5	856.8	6,340.0	489.3	92.0	.0	.0	342.1
Total	49,569.2	.0	.0	1,240.6	13,051.3	8,478.3	15,179.1	9,760.6	1,117.7	.0	.0	741.6
Total, South:												
120 +	12,681.4	149.1	.0	324.4	3,854.1	2,626.8	2,045.2	2,952.4	645.6	.0	.0	83.8
85 to 120	47,899.9	58.2	.0	3,825.5	14,271.3	8,664.7	11,055.0	8,619.2	999.6	88.9	.0	317.5
50 to 85	98,301.6	146.0	.0	10,282.0	24,181.0	15,606.7	31,750.8	12,572.1	1,424.8	288.1	.0	2,050.1
20 to 50	29,162.9	17.0	7.9	2,322.8	4,269.6	3,571.5	14,088.1	1,918.6	173.3	47.7	.0	2,746.4
Total	188,045.8	370.3	7.9	16,754.7	46,576.0	30,469.7	58,939.1	26,062.3	3,243.3	424.7	.0	5,197.8
Total, eastern regions:												
120 +	21,859.0	1,197.0	2,087.9	324.4	4,177.8	2,835.8	3,925.9	2,996.4	1,956.6	1,821.4	349.0	186.8
85 to 120	76,831.7	2,474.7	4,234.5	3,825.5	15,130.4	9,475.8	17,721.9	8,768.5	4,419.5	6,470.5	3,734.9	575.5
50 to 85	160,825.7	4,620.8	4,556.7	10,282.0	25,403.4	17,043.4	50,574.4	12,839.7	8,224.6	13,872.4	10,019.0	3,389.3
20 to 50	94,670.4	3,533.1	6,681.4	2,322.8	5,287.3	5,284.5	36,672.9	2,080.9	7,717.0	14,081.7	5,139.8	5,869.0
Total	354,186.8	11,825.6	17,560.5	16,754.7	49,998.9	34,639.5	108,895.1	26,685.5	22,317.7	36,246.0	19,242.7	10,020.6

Table 3.5—*Area of commercial timberland in the eastern United States, by ownership, forest type, productivity class, section, and region, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and productivity class	National Forest											
	Total	White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked
New England:												
120 +	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
85 to 120	4.0	.0	.0	.0	.0	.0	.0	.0	.0	4.0	.0	.0
50 to 85	467.5	1.0	24.0	.0	.0	.0	.0	.0	.0	424.5	18.0	.0
20 to 50	234.0	.0	48.0	.0	.0	.0	.0	.0	.0	169.0	17.0	.0
Total	705.5	1.0	72.0	.0	.0	.0	.0	.0	.0	597.5	35.0	.0
Middle Atlantic:												
120 +	160.1	.0	31.7	.0	.0	.0	36.6	.0	.0	91.0	.0	.8
85 to 120	389.8	3.4	3.9	.0	.0	.0	76.2	.0	.0	303.4	1.0	1.9
50 to 85	666.2	8.3	1.4	.0	.0	49.0	178.5	.0	.0	387.6	27.0	14.4
20 to 50	121.5	.5	.0	.0	.9	27.6	37.4	.0	12.8	41.1	1.0	.2
Total	1,337.6	12.2	37.0	.0	.9	76.6	328.7	.0	12.8	823.1	29.0	17.3
Lake States:												
120 +	1.5	.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
85 to 120	465.3	63.1	28.1	.0	.0	.0	12.0	.0	.0	196.3	165.8	.0
50 to 85	3,224.5	627.6	321.4	.0	.0	.0	162.0	.0	38.0	835.8	1,215.0	24.7
20 to 50	1,690.8	317.3	668.3	.0	.0	.0	71.1	.0	103.6	168.7	294.1	67.7
Total	5,382.1	1,008.0	1,019.3	.0	.0	.0	245.1	.0	141.6	1,200.8	1,674.9	92.4
Central States:												
120 +	25.7	.0	.0	.0	10.5	.0	15.2	.0	.0	.0	.0	.0
85 to 120	305.9	15.2	.0	.0	37.8	70.5	135.7	.0	9.5	37.2	.0	.0
50 to 85	987.9	.0	.0	.0	123.9	39.8	779.4	.0	2.9	22.9	.0	19.0
20 to 50	1,086.3	19.2	.0	.0	51.1	188.4	776.1	.0	4.0	15.2	.0	32.3
Total	2,405.8	34.4	.0	.0	223.3	298.7	1,706.4	.0	16.4	75.3	.0	51.3
Total, North:												
120 +	187.3	.0	33.2	.0	10.5	.0	51.8	.0	.0	91.0	.0	.8
85 to 120	1,165.0	81.7	32.0	.0	37.8	70.5	223.9	.0	9.5	540.9	166.8	1.9
50 to 85	5,346.1	636.9	346.8	.0	123.9	88.8	1,119.9	.0	40.9	1,670.8	1,260.0	58.1
20 to 50	3,132.6	337.0	716.3	.0	52.0	216.0	884.6	.0	120.4	394.0	312.1	100.2
Total	9,831.0	1,055.6	1,128.3	.0	224.2	375.3	2,280.2	.0	170.8	2,696.7	1,738.9	161.0
South Atlantic:												
120 +	97.1	9.7	.0	.0	8.3	28.3	50.8	.0	.0	.0	.0	.0
85 to 120	278.8	.0	.0	6.9	83.2	26.7	126.2	17.7	9.2	6.8	.0	2.1
50 to 85	1,529.4	8.7	.0	26.4	304.5	118.4	992.5	19.1	10.8	42.5	.0	6.5
20 to 50	1,120.3	1.7	.0	8.0	168.0	124.3	755.2	11.0	.0	1.6	.0	50.5
Total	3,025.6	20.1	.0	41.3	564.0	297.7	1,924.7	47.8	20.0	50.9	.0	59.1
East Gulf:												
120 +	97.8	25.3	.0	.0	17.7	20.1	34.7	.0	.0	.0	.0	.0
85 to 120	308.7	.0	.0	77.9	106.0	14.8	97.8	8.5	3.7	.0	.0	.0
50 to 85	994.1	.0	.0	257.6	208.5	128.6	301.2	65.1	.0	.0	.0	33.1
20 to 50	417.3	.0	.0	131.8	95.4	55.7	36.4	66.5	.0	.0	.0	31.5
Total	1,817.9	25.3	.0	467.3	427.6	219.2	470.1	140.1	3.7	.0	.0	64.6
Central Gulf:												
120 +	242.9	.0	.0	10.7	127.2	46.2	30.1	28.7	.0	.0	.0	.0
85 to 120	857.1	.0	.0	136.7	299.2	182.7	134.6	98.3	.0	5.6	.0	.0
50 to 85	970.5	15.5	.0	118.0	189.9	258.2	372.6	4.8	.0	11.5	.0	.0
20 to 50	248.0	5.6	.0	26.1	26.4	47.8	136.4	.0	.0	5.7	.0	.0
Total	2,318.5	21.1	.0	291.5	642.7	534.9	673.7	131.8	.0	22.8	.0	.0
West Gulf:												
120 +	169.6	.0	.0	14.5	74.7	46.7	3.0	25.1	5.6	.0	.0	.0
85 to 120	675.9	.0	.0	52.0	420.0	113.5	73.0	17.0	.0	.0	.0	.4
50 to 85	1,856.7	.0	.0	44.3	773.3	424.0	575.2	39.9	.0	.0	.0	.0
20 to 50	1,090.5	.0	.0	.0	236.5	165.7	670.9	10.9	.0	.0	.0	6.5
Total	3,792.7	.0	.0	110.8	1,504.5	749.9	1,322.1	92.9	5.6	.0	.0	6.9
Total, South:												
120 +	607.4	35.0	.0	25.2	227.9	141.3	118.6	53.8	5.6	.0	.0	.0
85 to 120	2,120.5	.0	.0	273.5	908.4	337.7	431.6	141.5	12.9	12.4	.0	2.5
50 to 85	5,350.7	24.2	.0	446.3	1,476.2	929.2	2,241.5	128.9	10.8	54.0	.0	39.6
20 to 50	2,876.1	7.3	.0	165.9	526.3	393.5	1,598.9	88.4	.0	7.3	.0	88.5
Total	10,954.7	66.5	.0	910.9	3,138.8	1,801.7	4,390.6	412.6	29.3	73.7	.0	130.6
Total, eastern regions:												
120 +	794.7	35.0	33.2	25.2	238.4	141.3	170.4	53.8	5.6	91.0	.0	.8
85 to 120	3,285.5	81.7	32.0	273.5	946.2	408.2	655.5	141.5	22.4	553.3	166.8	4.4
50 to 85	10,696.8	661.1	346.8	446.3	1,600.1	1,018.0	3,361.4	128.9	51.7	1,724.8	1,260.0	97.7
20 to 50	6,008.7	344.3	716.3	165.9	578.3	609.5	2,483.5	88.4	120.4	401.3	312.1	188.7
Total	20,785.7	1,122.1	1,128.3	910.9	3,363.0	2,177.0	6,670.8	412.6	200.1	2,770.4	1,738.9	291.6

Table 3.5—*Area of commercial timberland in the eastern United States, by ownership, forest type, productivity class, section, and region, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and productivity class	Other public											
	Total	White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cotton-wood	Maple-beech-birch	Aspen-birch	Non-stocked
New England:												
120 +	140.5	24.5	59.8	.0	.0	.0	.9	.0	12.3	31.8	11.2	.0
85 to 120	217.6	26.0	68.6	.0	.0	29.8	28.9	.0	16.2	43.4	4.7	.0
50 to 85	474.4	58.9	120.3	.0	11.9	1.7	47.6	.0	69.5	131.7	32.8	.0
20 to 50	548.8	100.7	67.5	.0	2.0	32.6	78.2	.0	107.6	110.6	37.4	12.2
Total	1,381.3	210.1	316.2	.0	13.9	64.1	155.6	.0	205.6	317.5	86.1	12.2
Middle Atlantic:												
120 +	289.3	110.4	22.0	.0	1.6	9.2	57.7	.0	18.5	38.9	11.0	20.0
85 to 120	730.4	57.4	9.0	.0	25.6	15.6	231.1	.0	28.2	305.9	51.6	6.0
50 to 85	2,169.5	79.8	8.0	.0	52.7	31.8	981.1	1.8	144.4	781.9	79.0	9.0
20 to 50	1,532.5	71.6	19.8	.0	79.3	73.3	867.3	4.7	77.4	260.7	23.2	55.2
Total	4,721.7	319.2	58.8	.0	159.2	129.9	2,137.2	6.5	268.5	1,387.4	164.8	90.2
Lake States:												
120 +	219.5	33.4	143.4	.0	.0	.0	6.3	.0	.3	.3	33.5	2.3
85 to 120	1,537.3	158.6	376.0	.0	.0	.0	14.0	.0	12.4	43.3	924.9	8.1
50 to 85	4,179.2	339.5	468.8	.0	.0	.0	139.6	.0	114.5	332.7	2,734.3	49.8
20 to 50	7,317.0	729.7	2,026.0	.0	.0	.0	629.5	.0	810.5	1,293.2	1,630.0	198.1
Total	13,253.0	1,261.2	3,014.2	.0	.0	.0	789.4	.0	937.7	1,669.5	5,322.7	258.3
Central States:												
120 +	75.2	2.0	.0	.0	1.9	1.0	36.2	.0	31.0	3.1	.0	.0
85 to 120	141.7	.0	.0	.0	15.7	2.1	73.2	4.8	39.7	4.0	2.2	.0
50 to 85	554.8	4.3	.0	.0	14.3	18.5	394.2	11.7	89.5	19.1	3.0	.2
20 to 50	553.9	5.0	.0	.0	3.8	27.6	388.3	3.1	62.1	24.6	1.0	38.4
Total	1,325.6	11.3	.0	.0	35.7	49.2	891.9	19.6	222.3	50.8	6.2	38.6
Total, North:												
120 +	724.5	170.3	225.2	.0	3.5	10.2	101.1	.0	62.1	74.1	55.7	22.3
85 to 120	2,627.0	242.0	453.6	.0	41.3	47.5	347.2	4.8	96.5	396.6	983.4	14.1
50 to 85	7,377.9	482.5	597.1	.0	78.9	52.0	1,562.5	13.5	417.9	1,265.4	2,849.1	59.0
20 to 50	9,952.2	907.0	2,113.3	.0	85.1	133.5	1,963.3	7.8	1,057.6	1,689.1	1,691.6	303.9
Total	20,681.6	1,801.8	3,389.2	.0	208.8	243.2	3,974.1	26.1	1,634.1	3,425.2	5,579.8	399.3
South Atlantic:												
120 +	15.6	.3	.0	.0	5.1	.0	2.8	5.4	2.0	.0	.0	.0
85 to 120	165.6	.1	.0	5.5	67.0	28.4	42.7	15.5	5.2	.0	.0	1.2
50 to 85	978.7	1.7	.0	124.7	296.1	96.0	329.6	78.7	40.1	4.3	.0	7.5
20 to 50	594.4	.0	.0	169.6	177.0	67.6	103.7	10.5	1.6	.0	.0	64.4
Total	1,754.3	2.1	.0	299.8	545.2	192.0	478.8	110.1	48.9	4.3	.0	73.1
East Gulf:												
120 +	25.2	.0	.0	5.3	11.5	.0	4.2	.0	.0	.0	.0	4.2
85 to 120	264.8	.3	.0	69.8	99.7	39.5	17.5	34.0	.0	.0	.0	4.0
50 to 85	1,047.6	.0	.0	422.6	169.3	145.0	62.2	137.7	12.7	.0	.0	98.1
20 to 50	504.8	.0	.0	107.9	44.6	113.9	27.4	26.3	.0	.0	.0	184.7
Total	1,842.4	.3	.0	605.6	325.1	298.4	111.3	198.0	12.7	.0	.0	291.0
Central Gulf:												
120 +	214.6	.0	.0	7.7	47.9	28.7	36.1	75.4	18.8	.0	.0	.0
85 to 120	536.9	.0	.0	19.5	151.6	103.6	114.2	127.6	20.4	.0	.0	.0
50 to 85	669.8	.0	.0	74.3	101.6	129.6	319.8	34.2	10.3	.0	.0	.0
20 to 50	210.6	.0	.0	27.3	19.1	61.4	102.8	.0	.0	.0	.0	.0
Total	1,631.9	.0	.0	128.8	320.2	323.3	572.9	237.2	49.5	.0	.0	.0
West Gulf:												
120 +	160.3	.0	.0	.0	31.5	5.0	.0	93.6	30.2	.0	.0	.0
85 to 120	302.4	.0	.0	.0	59.0	43.1	20.4	165.1	14.8	.0	.0	.0
50 to 85	695.8	.0	.0	4.5	98.0	66.9	195.3	264.6	53.1	.0	.0	13.4
20 to 50	388.8	.0	.0	10.3	29.4	40.3	224.7	72.4	11.7	.0	.0	.0
Total	1,547.3	.0	.0	14.8	217.9	155.3	440.4	595.7	109.8	.0	.0	13.4
Total, South:												
120 +	415.7	.3	.0	13.0	96.0	33.7	43.1	174.4	51.0	.0	.0	4.2
85 to 120	1,269.7	.4	.0	94.8	377.3	214.6	194.8	342.2	40.4	.0	.0	5.2
50 to 85	3,391.9	1.7	.0	626.1	665.0	437.5	906.9	515.2	116.2	4.3	.0	119.0
20 to 50	1,698.6	.0	.0	315.1	270.1	283.2	458.6	109.2	13.3	.0	.0	249.1
Total	6,775.9	2.4	.0	1,049.0	1,408.4	969.0	1,603.4	1,141.0	220.9	4.3	.0	377.5
Total, eastern regions:												
120 +	1,140.2	170.6	225.2	13.0	99.5	43.9	144.2	174.4	113.1	74.1	55.7	26.5
85 to 120	3,896.7	242.4	453.6	94.8	418.6	262.1	542.0	347.0	136.9	396.6	983.4	19.3
50 to 85	10,769.8	484.2	597.1	626.1	743.9	489.5	2,469.4	528.7	534.1	1,269.7	2,849.1	178.0
20 to 50	11,650.8	907.0	2,113.3	315.1	355.2	416.7	2,421.9	117.0	1,070.9	1,689.1	1,691.6	553.0
Total	27,457.5	1,804.2	3,389.2	1,049.0	1,617.2	1,212.2	5,577.5	1,167.1	1,855.0	3,429.5	5,579.8	776.8

Table 3.5—*Area of commercial timberland in the eastern United States, by ownership, forest type, productivity class, section, and region, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and productivity class	Forest industry											
	Total	White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked
New England:												
120 +	1,287.0	139.2	587.1	.0	.0	20.2	23.3	.0	227.2	188.4	101.6	.0
85 to 120	3,313.0	321.2	1,637.0	.0	.0	36.7	42.1	.0	479.1	540.3	256.6	.0
50 to 85	3,274.0	411.1	1,224.1	.0	.0	37.2	52.7	.0	546.2	679.2	323.5	.0
20 to 50	1,852.1	158.0	678.9	.0	.0	67.6	43.1	.0	245.9	518.4	140.2	.0
Total	9,726.1	1,029.5	4,127.1	.0	.0	161.7	161.2	.0	1,498.4	1,926.3	821.9	.0
Middle Atlantic:												
120 +	263.7	19.4	66.6	.0	13.5	.0	44.5	.0	30.5	89.2	.0	.0
85 to 120	813.4	28.1	34.9	.0	33.0	12.9	254.4	4.7	81.8	363.6	.0	.0
50 to 85	1,394.2	25.4	45.9	.0	50.7	13.1	368.0	8.2	136.7	718.6	27.6	.0
20 to 50	734.7	57.9	32.0	.0	4.7	4.1	108.6	10.2	82.7	394.1	17.0	23.4
Total	3,206.0	130.8	179.4	.0	101.9	30.1	775.5	23.1	331.7	1,565.5	44.6	23.4
Lake States:												
120 +	61.4	9.4	38.0	.0	.0	.0	.0	.0	1.8	1.4	10.8	.0
85 to 120	398.8	48.6	122.5	.0	.0	.0	1.4	.0	3.5	20.2	202.6	.0
50 to 85	1,054.1	91.5	183.2	.0	.0	.0	27.4	.0	21.8	223.6	505.5	1.1
20 to 50	2,662.5	154.3	509.9	.0	.0	.0	95.0	.0	221.2	1,342.5	319.3	20.3
Total	4,176.8	303.8	853.6	.0	.0	.0	123.8	.0	248.3	1,587.7	1,038.2	21.4
Central States:												
120 +	9.3	.0	.0	.0	.0	.6	4.9	.0	2.6	1.2	.0	.0
85 to 120	87.9	.0	.0	.0	4.0	3.7	46.7	.0	16.1	17.4	.0	.0
50 to 85	350.7	1.0	.0	.0	.5	15.0	277.8	1.0	23.8	30.1	1.0	.5
20 to 50	356.7	.0	.0	.0	.6	45.5	279.3	.0	18.4	9.4	.0	3.5
Total	804.6	1.0	.0	.0	5.1	64.8	608.7	1.0	60.9	58.1	1.0	4.0
Total, North:												
120 +	1,621.4	168.0	691.7	.0	13.5	20.8	72.7	.0	262.1	280.2	112.4	.0
85 to 120	4,613.1	397.9	1,794.4	.0	37.0	53.3	344.6	4.7	580.5	941.5	459.2	.0
50 to 85	6,073.0	529.0	1,453.2	.0	51.2	65.3	725.9	9.2	728.5	1,651.5	857.6	1.6
20 to 50	5,606.0	370.2	1,220.8	.0	5.3	117.2	526.0	10.2	568.2	2,264.4	476.5	47.2
Total	17,913.5	1,465.1	5,160.1	.0	107.0	256.6	1,669.2	24.1	2,139.3	5,137.6	1,905.7	48.8
South Atlantic:												
120 +	108.7	.0	.0	.0	27.1	41.7	24.2	15.7	.0	.0	.0	.0
85 to 120	1,023.5	5.3	.0	27.3	387.0	149.6	170.4	236.0	30.9	.0	.0	17.0
50 to 85	3,755.1	1.8	.0	198.5	1,797.4	491.2	652.7	480.1	60.4	2.3	.0	70.7
20 to 50	924.0	.0	.0	112.4	418.2	76.1	148.9	89.7	2.6	.0	.0	76.1
Total	5,811.3	7.1	.0	338.2	2,629.7	758.6	996.2	821.5	93.9	2.3	.0	163.8
East Gulf:												
120 +	123.4	.0	.0	37.7	13.4	25.8	26.7	19.8	.0	.0	.0	.0
85 to 120	2,001.8	.0	.0	852.2	350.7	227.2	171.9	297.5	38.9	.0	.0	63.4
50 to 85	6,467.3	.0	.0	2,833.7	874.2	731.9	505.3	1,150.6	84.2	.0	.0	287.4
20 to 50	1,044.3	.0	.0	417.2	61.6	104.7	50.4	192.3	.0	.0	.0	218.1
Total	9,636.8	.0	.0	4,140.8	1,299.9	1,089.6	754.3	1,660.2	123.1	.0	.0	568.9
Central Gulf:												
120 +	1,394.0	.0	.0	71.4	431.3	313.5	191.2	301.8	65.8	.0	.0	19.0
85 to 120	3,194.8	.0	.0	301.1	1,093.3	696.9	623.2	450.8	11.1	.0	.0	18.4
50 to 85	3,136.4	.0	.0	406.5	832.2	706.2	901.8	265.4	12.8	.0	.0	11.5
20 to 50	597.2	.0	.0	74.0	64.1	136.9	316.7	.0	.0	.0	.0	5.5
Total	8,322.4	.0	.0	853.0	2,420.9	1,853.5	2,032.9	1,018.0	89.7	.0	.0	54.4
West Gulf:												
120 +	1,729.2	.0	.0	34.1	623.6	343.9	204.0	417.2	95.0	.0	.0	11.4
85 to 120	4,822.5	.0	.0	185.1	1,925.3	1,178.6	663.8	817.7	46.5	.0	.0	5.5
50 to 85	5,208.3	.0	.0	240.7	2,129.5	1,135.4	792.5	851.5	24.0	.0	.0	34.7
20 to 50	714.5	.0	.0	62.4	175.4	202.0	231.3	27.9	.0	.0	.0	15.5
Total	12,474.5	.0	.0	522.3	4,853.8	2,859.9	1,891.6	2,114.3	165.5	.0	.0	67.1
Total, South:												
120 +	3,355.3	.0	.0	143.2	1,095.4	724.9	446.1	754.5	160.8	.0	.0	30.4
85 to 120	11,042.6	5.3	.0	1,365.7	3,756.3	2,252.3	1,629.3	1,802.0	127.4	.0	.0	104.3
50 to 85	18,567.1	1.8	.0	3,679.4	5,633.3	3,064.7	2,852.3	2,747.6	181.4	2.3	.0	404.3
20 to 50	3,280.0	.0	.0	666.0	719.3	519.7	747.3	309.9	2.6	.0	.0	315.2
Total	36,245.0	7.1	.0	5,854.3	11,204.3	6,561.6	5,675.0	5,614.0	472.2	2.3	.0	854.2
Total, eastern regions:												
120 +	4,976.7	168.0	691.7	143.2	1,108.9	745.7	518.8	754.5	422.9	280.2	112.4	30.4
85 to 120	15,655.7	403.2	1,794.4	1,365.7	3,793.3	2,305.6	1,973.9	1,806.7	707.9	941.5	459.2	104.3
50 to 85	24,640.1	530.8	1,453.2	3,679.4	5,684.5	3,130.0	3,578.2	2,756.8	909.9	1,653.8	857.6	405.9
20 to 50	8,886.0	370.2	1,220.8	666.0	724.6	636.9	1,273.3	320.1	570.8	2,264.4	476.5	362.4
Total	54,158.5	1,472.2	5,160.1	5,854.3	11,311.3	6,818.2	7,344.2	5,638.1	2,611.5	5,139.9	1,905.7	903.0

Table 3.5—*Area of commercial timberland in the eastern United States, by ownership, forest type, productivity class, section, and region, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and productivity class	Farmer and other private											
	Total	White-red-jack pine	Spruce-fir	Longleaf-slash pine	Loblolly-shortleaf pine	Oak-pine	Oak-hickory	Oak-gum-cypress	Elm-ash-cottonwood	Maple-beech-birch	Aspen-birch	Non-stocked
New England:												
120 +	2,116.7	409.9	896.7	.0	.0	27.1	23.4	.0	150.0	449.6	119.0	41.0
85 to 120	4,445.3	922.1	1,392.6	.0	7.2	71.6	220.0	.0	566.2	948.8	297.3	19.5
50 to 85	6,582.0	1,420.0	1,438.5	.0	54.0	205.8	638.3	.0	812.7	1,492.8	400.2	119.7
20 to 50	6,027.6	613.0	1,098.8	.0	67.5	174.7	947.6	.0	979.1	1,845.4	214.1	87.4
Total	19,171.6	3,365.0	4,826.6	.0	128.7	479.2	1,829.3	.0	2,508.0	4,736.6	1,030.6	267.6
Middle Atlantic:												
120 +	2,338.7	213.0	91.9	.0	160.6	76.5	795.4	18.8	208.3	726.3	27.7	20.2
85 to 120	8,183.5	443.0	138.7	.0	382.8	203.1	2,944.2	43.2	941.8	2,738.4	199.5	148.8
50 to 85	15,208.5	993.6	206.9	.0	566.7	463.0	5,601.3	111.1	1,671.0	4,331.9	650.1	612.9
20 to 50	11,418.6	591.6	181.9	.0	484.8	388.2	3,868.0	47.6	1,573.5	3,052.8	425.4	804.8
Total	37,149.3	2,241.2	619.4	.0	1,594.9	1,130.8	13,208.9	220.7	4,394.6	10,849.4	1,302.7	1,586.7
Lake States:												
120 +	299.5	85.8	146.4	.0	.0	.0	2.5	.0	10.8	13.6	34.2	6.2
85 to 120	2,666.0	313.1	422.3	.0	.0	.0	67.8	.0	45.5	176.4	1,616.0	24.9
50 to 85	8,468.5	364.3	503.5	.0	.0	.0	1,218.8	.0	668.9	1,559.5	3,960.1	193.4
20 to 50	13,333.4	589.2	1,338.6	.0	.0	.0	3,288.8	.0	1,830.3	3,781.2	1,996.6	508.7
Total	24,767.4	1,352.4	2,410.8	.0	.0	.0	4,577.9	.0	2,555.5	5,530.7	7,606.9	733.2
Central States:												
120 +	1,889.5	.9	2.8	.0	135.6	74.4	833.8	25.2	617.7	186.6	.0	12.5
85 to 120	5,231.9	16.7	.9	.0	353.0	365.1	2,519.2	96.6	1,179.9	639.0	12.7	48.8
50 to 85	13,468.1	48.5	10.7	.0	347.7	561.8	7,956.9	133.8	2,459.9	1,612.4	41.9	294.5
20 to 50	16,037.1	108.1	3.8	.0	323.0	683.4	11,106.5	96.7	1,414.6	1,007.1	23.5	1,270.4
Total	36,626.6	174.2	18.2	.0	1,159.3	1,684.7	22,416.4	352.3	5,672.1	3,445.1	78.1	1,626.2
Total, North:												
120 +	6,644.4	709.6	1,137.8	.0	296.2	178.0	1,655.1	44.0	986.8	1,376.1	180.9	79.9
85 to 120	20,526.7	1,694.9	1,954.5	.0	743.0	639.8	5,751.2	139.8	2,733.4	4,502.6	2,125.5	242.0
50 to 85	43,727.1	2,826.4	2,159.6	.0	968.4	1,230.6	15,415.3	244.9	5,612.5	8,996.6	5,052.3	1,220.5
20 to 50	46,816.7	1,901.9	2,623.1	.0	875.3	1,246.3	19,210.9	144.3	5,797.5	9,686.5	2,659.6	2,671.3
Total	117,714.9	7,132.8	7,875.0	.0	2,882.9	3,294.7	42,032.5	573.0	15,130.2	24,561.8	10,018.3	4,213.7
South Atlantic:												
120 +	611.2	108.9	.0	.0	194.8	73.4	144.5	63.4	18.1	.0	.0	8.1
85 to 120	5,614.3	41.3	.0	46.5	1,590.4	722.6	1,909.3	875.8	337.2	59.6	.0	31.6
50 to 85	23,932.0	111.9	.0	463.8	6,540.3	3,384.5	10,582.3	1,949.1	440.4	188.5	.0	271.2
20 to 50	6,928.4	9.5	7.9	388.8	1,565.8	1,034.2	2,917.9	377.6	68.7	34.7	.0	523.3
Total	37,085.9	271.6	7.9	899.1	9,891.3	5,214.7	15,554.0	3,265.9	864.4	282.8	.0	834.2
East Gulf:												
120 +	582.8	4.9	.0	51.4	214.2	128.1	84.2	70.6	29.4	.0	.0	.0
85 to 120	5,632.1	.0	.0	1,419.7	1,682.9	855.0	876.0	600.9	150.9	.0	.0	46.7
50 to 85	17,136.0	.0	.0	4,101.9	3,646.0	2,545.0	2,996.0	2,685.0	302.3	.0	.0	859.8
20 to 50	3,494.3	.0	.0	620.2	387.2	349.0	419.0	512.1	8.4	.0	.0	1,198.4
Total	26,845.2	4.9	.0	6,193.2	5,930.3	3,877.1	4,375.2	3,868.6	491.0	.0	.0	2,104.9
Central Gulf:												
120 +	4,491.4	.0	.0	78.0	1,293.0	1,054.5	901.1	1,024.1	122.5	.0	.0	18.2
85 to 120	14,054.8	11.2	.0	421.8	3,422.6	2,686.4	4,725.6	2,558.9	140.2	16.9	.0	71.2
50 to 85	15,773.9	6.4	.0	629.5	3,351.5	3,048.4	7,455.9	1,076.2	66.0	39.0	.0	101.0
20 to 50	4,064.3	.2	.0	126.2	460.7	543.1	2,733.3	143.3	.0	5.7	.0	51.8
Total	38,384.4	17.8	.0	1,255.5	8,527.8	7,332.4	15,815.9	4,802.5	328.7	61.6	.0	242.2
West Gulf:												
120 +	2,617.6	.0	.0	13.6	732.8	470.9	307.6	811.6	258.2	.0	.0	22.9
85 to 120	8,165.9	.0	.0	203.5	2,533.4	1,596.1	1,288.4	2,297.9	190.6	.0	.0	56.0
50 to 85	14,150.0	.0	.0	335.0	2,868.7	2,197.4	4,715.9	3,470.1	307.7	.0	.0	255.2
20 to 50	6,821.2	.0	.0	40.6	340.2	448.8	5,213.1	378.1	80.3	.0	.0	320.1
Total	31,754.7	.0	.0	592.7	6,475.1	4,713.2	11,525.0	6,957.7	836.8	.0	.0	654.2
Total, South:												
120 +	8,303.0	113.8	.0	143.0	2,434.8	1,726.9	1,437.4	1,969.7	428.2	.0	.0	49.2
85 to 120	33,467.1	52.5	.0	2,091.5	9,229.3	5,860.1	8,799.3	6,333.5	818.9	76.5	.0	205.5
50 to 85	70,991.9	118.3	.0	5,530.2	16,406.5	11,175.3	25,750.1	9,180.4	1,116.4	227.5	.0	1,487.2
20 to 50	21,308.2	9.7	7.9	1,175.8	2,753.9	2,375.1	11,283.3	1,411.1	157.4	40.4	.0	2,093.6
Total	134,070.2	294.3	7.9	8,940.5	30,824.5	21,137.4	47,270.1	18,894.7	2,520.9	344.4	.0	3,835.5
Total, eastern regions:												
120 +	14,947.4	823.4	1,137.8	143.0	2,731.0	1,904.9	3,092.5	2,013.7	1,415.0	1,376.1	180.9	129.1
85 to 120	53,993.8	1,747.4	1,954.5	2,091.5	9,972.3	6,499.9	14,550.5	6,473.3	3,552.3	4,579.1	2,125.5	447.5
50 to 85	114,719.0	2,944.7	2,159.6	5,530.2	17,374.9	12,405.9	41,165.4	9,425.3	6,728.9	9,224.1	5,052.3	2,707.7
20 to 50	68,124.9	1,911.6	2,631.0	1,175.8	3,629.2	3,621.4	30,494.2	1,555.4	5,954.9	9,726.9	2,659.6	4,764.9
Total	251,785.1	7,427.1	7,882.9	8,940.5	33,707.4	24,432.1	89,302.6	19,467.7	17,651.1	24,906.2	10,018.3	8,049.2

Table 3.6—*Area of commercial timberland in the western United States, by ownership, forest type, productivity class, section, and region, January 1, 1977*

[Thousand acres]

Section, region and productivity class	All Ownerships											
	Total	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Other western softwoods	Western hardwoods	Non-stocked
Pacific Northwest: Douglas-fir subregion (Western Oregon and western Washington):												
120 +	13,933.0	6,960.0	48.0	9.0	569.0	3,247.0	6.0	7.0	8.0	.0	2,578.0	501.0
85 to 120	4,692.0	2,387.0	58.0	7.0	384.0	627.0	10.0	27.0	2.0	.0	855.0	335.0
50 to 85	4,020.0	2,121.0	90.0	13.0	455.0	471.0	11.0	95.0	2.0	.0	528.0	234.0
20 to 50	794.0	265.0	72.0	6.0	90.0	32.0	.0	35.0	.0	.0	208.0	86.0
Total	23,439.0	11,733.0	268.0	35.0	1,498.0	4,377.0	27.0	164.0	12.0	.0	4,169.0	1,156.0
Pine subregion (Eastern Oregon and eastern Washington):												
120 +	1,458.0	306.0	240.0	21.0	597.0	50.0	117.0	42.0	.0	.0	48.0	37.0
85 to 120	3,610.0	413.0	1,376.0	22.0	581.0	89.0	184.0	767.0	.0	.0	65.0	113.0
50 to 85	10,397.0	2,841.0	3,564.0	16.0	1,408.0	236.0	275.0	1,470.0	.0	.0	114.0	473.0
20 to 50	3,229.0	675.0	1,546.0	4.0	420.0	20.0	80.0	216.0	.0	.0	51.0	217.0
Total	18,694.0	4,235.0	6,726.0	63.0	3,006.0	395.0	656.0	2,495.0	.0	.0	278.0	840.0
Coastal Alaska:												
120 +	1,447.0	.0	.0	.0	.0	1,381.9	.0	.0	.0	.0	37.8	27.3
85 to 120	2,673.2	.0	.0	.0	.0	2,627.0	.0	.0	.0	.0	43.0	3.2
50 to 85	2,751.6	.0	.0	.0	6.7	2,629.1	.0	.0	.0	.0	113.2	2.6
20 to 50	168.4	.0	.0	.0	.0	160.3	.0	.0	.0	.0	4.7	3.4
Total	7,040.2	.0	.0	.0	6.7	6,798.3	.0	.0	.0	.0	198.7	36.5
Interior Alaska:												
120 +	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
85 to 120	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50 to 85	67.7	.0	.0	.0	1.4	.0	.0	.0	.0	.0	66.3	.0
20 to 50	4,042.2	.0	.0	.0	1,521.8	.0	.0	.0	.0	.0	2,471.6	48.8
Total	4,109.9	.0	.0	.0	1,523.2	.0	.0	.0	.0	.0	2,537.9	48.8
Total, Pacific Northwest:												
120 +	16,838.0	7,266.0	288.0	30.0	1,166.0	4,678.9	123.0	49.0	8.0	.0	2,663.8	565.3
85 to 120	10,975.2	2,800.0	1,434.0	29.0	965.0	3,343.0	194.0	794.0	2.0	.0	963.0	451.2
50 to 85	17,236.3	4,962.0	3,654.0	29.0	1,871.1	3,336.1	286.0	1,565.0	2.0	.0	821.5	709.6
20 to 50	8,233.6	940.0	1,618.0	10.0	2,031.8	212.3	80.0	251.0	.0	.0	2,735.3	355.2
Total	53,283.1	15,968.0	6,994.0	98.0	6,033.9	11,570.3	683.0	2,659.0	12.0	.0	7,183.6	2,081.3
Pacific Southwest:												
120 +	5,082.0	472.0	695.0	2.0	1,135.0	29.0	.0	5.0	579.0	.0	1,126.0	1,039.0
85 to 120	3,620.0	548.0	1,160.0	1.0	840.0	3.0	.0	14.0	37.0	.0	764.0	253.0
50 to 85	5,887.0	1,418.0	1,811.0	4.0	1,200.0	9.0	.0	165.0	34.0	.0	967.0	279.0
20 to 50	2,662.0	271.0	1,316.0	21.0	523.0	9.0	.0	76.0	.0	.0	267.0	179.0
Total	17,251.0	2,709.0	4,982.0	28.0	3,698.0	50.0	.0	260.0	650.0	.0	3,124.0	1,750.0
Total, Pacific Coast:												
120 +	21,920.0	7,738.0	983.0	32.0	2,301.0	4,707.9	123.0	54.0	587.0	.0	3,789.8	1,604.3
85 to 120	14,595.2	3,348.0	2,594.0	30.0	1,805.0	3,346.0	194.0	808.0	39.0	.0	1,727.0	704.2
50 to 85	23,123.3	6,380.0	5,465.0	33.0	3,071.1	3,345.1	286.0	1,730.0	36.0	.0	1,788.5	988.6
20 to 50	10,895.6	1,211.0	2,934.0	31.0	2,554.8	221.3	80.0	327.0	.0	.0	3,002.3	534.2
Total	70,534.1	18,677.0	11,976.0	126.0	9,731.9	11,620.3	683.0	2,919.0	662.0	.0	10,307.6	3,831.3
Northern Rocky Mtn.:												
120 +	3,426.1	863.2	101.7	154.3	942.6	471.2	522.4	351.4	.0	.0	.0	19.3
85 to 120	6,777.8	2,050.7	497.9	119.8	1,613.6	425.3	534.1	1,367.3	.0	13.0	8.6	147.5
50 to 85	10,456.2	3,433.2	1,434.7	38.1	2,053.0	237.6	585.3	2,215.2	.0	93.2	141.3	224.6
20 to 50	12,818.2	2,922.9	3,743.9	6.7	995.4	109.1	107.1	3,682.3	.0	228.6	473.4	548.8
Total	33,478.3	9,270.0	5,778.2	318.9	5,604.6	1,243.2	1,748.9	7,616.2	.0	334.8	623.3	940.2
Southern Rocky Mtn.:												
120 +	70.4	1.6	38.7	.0	17.7	.0	.0	.0	.0	.1	12.1	.2
85 to 120	741.3	106.2	131.5	.0	336.9	.0	.0	12.7	.0	3.3	134.3	16.4
50 to 85	5,741.4	918.3	1,673.4	.7	2,080.5	.0	.0	136.9	.0	21.1	721.7	188.8
20 to 50	17,733.6	1,924.1	7,051.0	.0	2,084.1	2.4	.0	2,049.9	.0	148.0	3,063.4	1,410.7
Total	24,286.7	2,950.2	8,894.6	.7	4,519.2	2.4	.0	2,199.5	.0	172.5	3,931.5	1,616.1
Total, Rocky Mtn.:												
120 +	3,496.5	864.8	140.4	154.3	960.3	471.2	522.4	351.4	.0	.1	12.1	19.5
85 to 120	7,519.1	2,156.9	629.4	119.8	1,950.5	425.3	534.1	1,380.0	.0	16.3	142.9	163.9
50 to 85	16,197.6	4,351.5	3,108.1	38.8	4,133.5	237.6	585.3	2,352.1	.0	114.3	863.0	413.4
20 to 50	30,551.8	4,847.0	10,794.9	6.7	3,079.5	111.5	107.1	5,732.2	.0	376.6	3,536.8	1,959.5
Total	57,765.0	12,220.2	14,672.8	319.6	10,123.8	1,245.6	1,748.9	9,815.7	.0	507.3	4,554.8	2,556.3
Total, western regions												
120 +	25,416.5	8,602.8	1,123.4	186.3	3,261.3	5,179.1	645.4	405.4	587.0	.1	3,801.9	1,623.8
85 to 120	22,114.3	5,504.9	3,223.4	149.8	3,755.5	3,771.3	728.1	2,188.0	39.0	16.3	1,869.9	868.1
50 to 85	39,320.9	10,731.5	8,573.1	71.8	7,204.6	3,582.7	871.3	4,082.1	36.0	114.3	2,651.5	1,402.0
20 to 50	41,447.4	6,058.0	13,728.9	37.7	5,634.3	332.8	187.1	6,059.2	.0	376.6	6,539.1	2,493.7
Total	128,299.1	30,897.2	26,648.8	445.6	19,855.7	12,865.9	2,431.9	12,734.7	662.0	507.3	14,862.4	6,387.6

Table 3.6—*Area of commercial timberland in the western United States, by ownership, forest type, productivity class, section, and region, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and productivity class	National Forest											
	Total	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodge-pole pine	Redwood	Other western soft-woods	Western hard-woods	Non-stocked
Pacific Northwest:												
Douglas-fir subregion (Western Oregon and western Washington):												
120 +	2,890.0	1,515.0	21.0	9.0	313.0	739.0	.0	7.0	2.0	.0	212.0	72.0
85 to 120	1,588.0	853.0	14.0	7.0	288.0	205.0	.0	24.0	2.0	.0	131.0	64.0
50 to 85	2,016.0	1,175.0	34.0	13.0	415.0	137.0	.0	69.0	2.0	.0	88.0	83.0
20 to 50	293.0	119.0	19.0	6.0	82.0	23.0	.0	26.0	.0	.0	11.0	7.0
Total	6,787.0	3,662.0	88.0	35.0	1,098.0	1,104.0	.0	126.0	6.0	.0	442.0	226.0
Pine subregion (Eastern Oregon and eastern Washington):												
120 +	693.0	223.0	88.0	15.0	178.0	34.0	96.0	34.0	.0	.0	5.0	20.0
85 to 120	2,186.0	231.0	634.0	22.0	362.0	55.0	118.0	714.0	.0	.0	10.0	40.0
50 to 85	5,437.0	1,078.0	2,023.0	16.0	1,091.0	138.0	125.0	858.0	.0	.0	8.0	100.0
20 to 50	1,697.0	311.0	795.0	4.0	386.0	20.0	61.0	73.0	.0	.0	4.0	43.0
Total	10,013.0	1,843.0	3,540.0	57.0	2,017.0	247.0	400.0	1,679.0	.0	.0	27.0	203.0
Coastal Alaska:												
120 +	1,387.0	.0	.0	.0	.0	1,326.2	.0	.0	.0	.0	33.6	27.2
85 to 120	2,550.1	.0	.0	.0	.0	2,521.6	.0	.0	.0	.0	25.3	3.2
50 to 85	2,445.0	.0	.0	.0	6.7	2,376.3	.0	.0	.0	.0	59.4	2.6
20 to 50	146.6	.0	.0	.0	.0	142.4	.0	.0	.0	.0	4.0	.2
Total	6,528.7	.0	.0	.0	6.7	6,366.5	.0	.0	.0	.0	122.3	33.2
Interior Alaska:												
120 +	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
85 to 120	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50 to 85	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20 to 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total, Pacific Northwest:												
120 +	4,970.0	1,738.0	109.0	24.0	491.0	2,099.2	96.0	41.0	2.0	.0	250.6	119.2
85 to 120	6,324.1	1,084.0	648.0	29.0	650.0	2,781.6	118.0	738.0	2.0	.0	166.3	107.2
50 to 85	9,898.0	2,253.0	2,057.0	29.0	1,512.7	2,651.3	125.0	927.0	2.0	.0	155.4	185.6
20 to 50	2,136.6	430.0	814.0	10.0	468.0	185.4	61.0	99.0	.0	.0	19.0	50.2
Total	23,328.7	5,505.0	3,628.0	92.0	3,121.7	7,717.5	400.0	1,805.0	6.0	.0	591.3	462.2
Pacific Southwest:												
120 +	1,374.0	156.0	363.0	2.0	748.0	7.0	.0	.0	21.0	.0	42.0	35.0
85 to 120	1,919.0	322.0	816.0	1.0	567.0	3.0	.0	12.0	.0	.0	110.0	88.0
50 to 85	3,576.0	925.0	1,242.0	4.0	892.0	9.0	.0	132.0	.0	.0	241.0	131.0
20 to 50	1,299.0	140.0	677.0	21.0	313.0	9.0	.0	44.0	.0	.0	32.0	63.0
Total	8,168.0	1,543.0	3,098.0	28.0	2,520.0	28.0	.0	188.0	21.0	.0	425.0	317.0
Total, Pacific Coast:												
120 +	6,344.0	1,894.0	472.0	26.0	1,239.0	2,106.2	96.0	41.0	23.0	.0	292.6	154.2
85 to 120	8,243.1	1,406.0	1,464.0	30.0	1,217.0	2,784.6	118.0	750.0	2.0	.0	276.3	195.2
50 to 85	13,474.0	3,178.0	3,299.0	33.0	2,404.7	2,660.3	125.0	1,059.0	2.0	.0	396.4	316.6
20 to 50	3,435.6	570.0	1,491.0	31.0	781.0	194.4	61.0	143.0	.0	.0	51.0	113.2
Total	31,496.7	7,048.0	6,726.0	120.0	5,641.7	7,745.5	400.0	1,993.0	27.0	.0	1,016.3	779.2
Northern Rocky Mtn.:												
120 +	2,699.1	703.6	60.6	77.4	786.6	385.9	335.5	339.2	.0	.0	.0	10.3
85 to 120	5,184.6	1,584.3	196.6	57.2	1,219.3	270.2	398.3	1,321.4	.0	7.8	2.0	127.5
50 to 85	6,461.5	2,007.3	529.2	16.2	1,499.7	104.5	183.3	1,905.3	.0	59.9	59.5	96.6
20 to 50	6,967.0	1,431.7	1,467.8	6.7	810.3	20.8	22.4	2,575.5	.0	206.4	107.5	317.9
Total	21,312.2	5,726.9	2,254.2	157.5	4,315.9	781.4	939.5	6,141.4	.0	274.1	169.0	552.3
Southern Rocky Mtn.:												
120 +	11.4	1.6	7.0	.0	2.5	.0	.0	.0	.0	.1	.0	.2
85 to 120	423.9	49.0	19.2	.0	269.3	.0	.0	9.1	.0	.8	60.1	16.4
50 to 85	3,976.8	648.6	746.1	.7	1,646.4	.0	.0	126.4	.0	5.3	614.5	188.8
20 to 50	10,711.6	918.2	3,904.1	.0	1,652.5	1.6	.0	1,523.9	.0	59.3	1,541.4	1,110.6
Total	15,123.7	1,617.4	4,676.4	.7	3,570.7	1.6	.0	1,659.4	.0	65.5	2,216.0	1,316.0
Total, Rocky Mtn.:												
120 +	2,710.5	705.2	67.6	77.4	789.1	385.9	335.5	339.2	.0	.1	.0	10.5
85 to 120	5,608.5	1,633.3	215.8	57.2	1,488.6	270.2	398.3	1,330.5	.0	8.6	62.1	143.9
50 to 85	10,438.3	2,655.9	1,275.3	16.9	3,146.1	104.5	183.3	2,031.7	.0	65.2	674.0	285.4
20 to 50	17,678.6	2,349.9	5,371.9	6.7	2,462.8	22.4	22.4	4,099.4	.0	265.7	1,648.9	1,428.5
Total	36,435.9	7,344.3	6,930.6	158.2	7,886.6	783.0	939.5	7,800.8	.0	339.6	2,385.0	1,868.3
Total, western regions:												
120 +	9,054.5	2,599.2	539.6	103.4	2,028.1	2,492.1	431.5	380.2	23.0	.1	292.6	164.7
85 to 120	13,851.6	3,039.3	1,679.8	87.2	2,705.6	3,054.8	516.3	2,080.5	2.0	8.6	338.4	339.1
50 to 85	23,912.3	5,833.9	4,574.3	49.9	5,550.8	2,764.8	308.3	3,090.7	2.0	65.2	1,070.4	602.0
20 to 50	21,114.2	2,919.9	6,862.9	37.7	3,243.8	216.8	83.4	4,242.4	.0	265.7	1,699.9	1,541.7
Total	67,932.6	14,392.3	13,656.6	278.2	13,528.3	8,528.5	1,339.5	9,793.8	27.0	339.6	3,401.3	2,647.5

Table 3.6—*Area of commercial timberland in the western United States, by ownership, forest type, productivity class, section, and region, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and productivity class	Other public: Total	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodge-pole pine	Redwood	Other western soft-woods	Western hard-woods	Non-stocked
Pacific Northwest:												
Douglas-fir subregion (Western Oregon and western Washington):												
120 +	3,106.0	1,827.0	9.0	.0	86.0	671.0	.0	.0	.0	.0	436.0	77.0
85 to 120	836.0	544.0	19.0	.0	16.0	111.0	8.0	3.0	.0	.0	89.0	46.0
50 to 85	613.0	382.0	19.0	.0	1.0	77.0	.0	6.0	.0	.0	103.0	25.0
20 to 50	94.0	39.0	2.0	.0	.0	7.0	.0	9.0	.0	.0	25.0	12.0
Total	4,649.0	2,792.0	49.0	.0	103.0	866.0	8.0	18.0	.0	.0	653.0	160.0
Pine subregion (Eastern Oregon and eastern Washington):												
120 +	298.0	56.0	77.0	.0	145.0	.0	4.0	.0	.0	.0	16.0	.0
85 to 120	498.0	92.0	272.0	.0	58.0	18.0	41.0	.0	.0	.0	8.0	9.0
50 to 85	1,745.0	671.0	540.0	.0	104.0	37.0	65.0	232.0	.0	.0	14.0	82.0
20 to 50	331.0	81.0	155.0	.0	.0	.0	4.0	39.0	.0	.0	11.0	41.0
Total	2,872.0	900.0	1,044.0	.0	307.0	55.0	114.0	271.0	.0	.0	49.0	132.0
Coastal Alaska:												
120 +	24.8	.0	.0	.0	.0	20.8	.0	.0	.0	.0	4.0	.0
85 to 120	99.4	.0	.0	.0	.0	81.7	.0	.0	.0	.0	17.7	.0
50 to 85	281.6	.0	.0	.0	.0	227.8	.0	.0	.0	.0	53.8	.0
20 to 50	20.3	.0	.0	.0	.0	16.4	.0	.0	.0	.0	.7	3.2
Total	426.1	.0	.0	.0	.0	346.7	.0	.0	.0	.0	76.2	3.2
Interior Alaska:												
120 +	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
85 to 120	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50 to 85	67.7	.0	.0	.0	1.4	.0	.0	.0	.0	.0	66.3	.0
20 to 50	3,838.8	.0	.0	.0	1,513.7	.0	.0	.0	.0	.0	2,276.3	48.8
Total	3,906.5	.0	.0	.0	1,515.1	.0	.0	.0	.0	.0	2,342.6	48.8
Total, Pacific Northwest:												
120 +	3,428.8	1,883.0	86.0	.0	231.0	691.8	4.0	.0	.0	.0	456.0	77.0
85 to 120	1,433.4	636.0	291.0	.0	74.0	210.7	49.0	3.0	.0	.0	114.7	55.0
50 to 85	2,707.3	1,053.0	559.0	.0	106.4	341.8	65.0	238.0	.0	.0	237.1	107.0
20 to 50	4,284.1	120.0	157.0	.0	1,513.7	23.4	4.0	48.0	.0	.0	2,313.0	105.0
Total	11,853.6	3,692.0	1,093.0	.0	1,925.1	1,267.7	122.0	289.0	.0	.0	3,120.8	344.0
Pacific Southwest:												
120 +	577.0	30.0	7.0	.0	11.0	.0	.0	.0	18.0	.0	173.0	338.0
85 to 120	99.0	29.0	5.0	.0	2.0	.0	.0	.0	2.0	.0	49.0	12.0
50 to 85	192.0	27.0	36.0	.0	3.0	.0	.0	.0	.0	.0	103.0	23.0
20 to 50	93.0	4.0	28.0	.0	15.0	.0	.0	.0	.0	.0	36.0	10.0
Total	961.0	90.0	76.0	.0	31.0	.0	.0	.0	20.0	.0	361.0	383.0
Total, Pacific Coast:												
120 +	4,005.8	1,913.0	93.0	.0	242.0	691.8	4.0	.0	18.0	.0	629.0	415.0
85 to 120	1,532.4	665.0	296.0	.0	76.0	210.7	49.0	3.0	2.0	.0	163.7	67.0
50 to 85	2,899.3	1,080.0	595.0	.0	109.4	341.8	65.0	238.0	.0	.0	340.1	130.0
20 to 50	4,377.1	124.0	185.0	.0	1,528.7	23.4	4.0	48.0	.0	.0	2,349.0	115.0
Total	12,814.6	3,782.0	1,169.0	.0	1,956.1	1,267.7	122.0	289.0	20.0	.0	3,481.8	727.0
Northern Rocky Mtn.:												
120 +	196.1	43.1	11.7	38.6	61.9	8.6	32.2	.0	.0	.0	.0	.0
85 to 120	532.6	155.3	94.2	28.7	159.4	67.8	21.2	5.1	.0	.8	.1	.0
50 to 85	1,119.2	459.6	224.8	.4	194.5	41.5	72.3	83.6	.0	7.7	19.5	15.3
20 to 50	1,661.5	468.2	577.8	.0	43.9	15.6	29.9	350.5	.0	2.6	88.2	84.8
Total	3,509.4	1,126.2	908.5	67.7	459.7	133.5	155.6	439.2	.0	11.1	107.8	100.1
Southern Rocky Mtn.:												
120 +	7.7	.0	4.0	.0	1.6	.0	.0	.0	.0	.0	2.1	.0
85 to 120	159.3	29.2	108.2	.0	11.6	.0	.0	1.9	.0	.8	7.6	.0
50 to 85	831.5	71.4	628.7	.0	116.5	.0	.0	3.8	.0	2.8	8.3	.0
20 to 50	2,223.3	284.8	1,297.1	.0	155.2	.0	.0	126.2	.0	19.1	319.0	21.9
Total	3,221.8	385.4	2,038.0	.0	284.9	.0	.0	131.9	.0	22.7	337.0	21.9
Total, Rocky Mtn.:												
120 +	203.8	43.1	15.7	38.6	63.5	8.6	32.2	.0	.0	.0	2.1	.0
85 to 120	691.9	184.5	202.4	28.7	171.0	67.8	21.2	7.0	.0	1.6	7.7	.0
50 to 85	1,950.7	531.0	853.5	.4	311.0	41.5	72.3	87.4	.0	10.5	27.8	15.3
20 to 50	3,884.8	753.0	1,874.9	.0	199.1	15.6	29.9	476.7	.0	21.7	407.2	106.7
Total	6,731.2	1,511.6	2,946.5	67.7	744.6	133.5	155.6	571.1	.0	33.8	444.8	122.0
Total, western regions:												
120 +	4,209.6	1,956.1	108.7	38.6	305.5	700.4	36.2	.0	18.0	.0	631.1	415.0
85 to 120	2,224.3	849.5	498.4	28.7	247.0	278.5	70.2	10.0	2.0	1.6	171.4	67.0
50 to 85	4,850.0	1,611.0	1,448.5	.4	420.4	383.3	137.3	325.4	.0	10.5	367.9	145.3
20 to 50	8,261.9	877.0	2,059.9	.0	1,727.8	39.0	33.9	524.7	.0	21.7	2,756.2	221.7
Total	19,545.8	5,293.6	4,115.5	67.7	2,700.7	1,401.2	277.6	860.1	20.0	33.8	3,926.6	849.0

Table 3.6—*Area of commercial timberland in the western United States, by ownership, forest type, productivity class, section, and region, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and productivity class	Forest industry											
	Total	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodge-pole pine	Redwood	Other western soft-woods	Western hard-woods	Non-stocked
Pacific Northwest:												
Douglas-fir subregion (Western Oregon and western Washington):												
120 +	5,409.0	2,576.0	5.0	.0	149.0	1,471.0	.0	.0	6.0	.0	993.0	209.0
85 to 120	1,282.0	665.0	17.0	.0	36.0	177.0	.0	.0	.0	.0	293.0	94.0
50 to 85	632.0	306.0	13.0	.0	35.0	130.0	.0	20.0	.0	.0	98.0	30.0
20 to 50	153.0	63.0	34.0	.0	.0	2.0	.0	.0	.0	.0	50.0	4.0
Total	7,476.0	3,610.0	69.0	.0	220.0	1,780.0	.0	20.0	6.0	.0	1,434.0	337.0
Pine subregion (Eastern Oregon and eastern Washington):												
120 +	242.0	14.0	35.0	.0	168.0	16.0	9.0	.0	.0	.0	.0	.0
85 to 120	409.0	45.0	222.0	.0	101.0	.0	5.0	28.0	.0	.0	.0	8.0
50 to 85	1,340.0	280.0	548.0	.0	119.0	45.0	39.0	223.0	.0	.0	22.0	64.0
20 to 50	374.0	67.0	209.0	.0	25.0	.0	.0	45.0	.0	.0	.0	28.0
Total	2,365.0	406.0	1,014.0	.0	413.0	61.0	53.0	296.0	.0	.0	22.0	100.0
Coastal Alaska:												
120 +	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
85 to 120	.2	.0	.0	.0	.0	.2	.0	.0	.0	.0	.0	.0
50 to 85	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20 to 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	.2	.0	.0	.0	.0	.2	.0	.0	.0	.0	.0	.0
Interior Alaska:												
120 +	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
85 to 120	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50 to 85	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20 to 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total, Pacific Northwest:												
120 +	5,651.0	2,590.0	40.0	.0	317.0	1,487.0	9.0	.0	6.0	.0	993.0	209.0
85 to 120	1,691.2	710.0	239.0	.0	137.0	177.2	5.0	28.0	.0	.0	293.0	102.0
50 to 85	1,972.0	586.0	561.0	.0	154.0	175.0	39.0	243.0	.0	.0	120.0	94.0
20 to 50	527.0	130.0	243.0	.0	25.0	2.0	.0	45.0	.0	.0	50.0	32.0
Total	9,841.2	4,016.0	1,083.0	.0	633.0	1,841.2	53.0	316.0	6.0	.0	1,456.0	437.0
Pacific Southwest:												
120 +	1,218.0	130.0	134.0	.0	211.0	8.0	.0	5.0	279.0	.0	252.0	199.0
85 to 120	544.0	62.0	127.0	.0	125.0	.0	.0	.0	15.0	.0	179.0	36.0
50 to 85	589.0	146.0	140.0	.0	107.0	.0	.0	5.0	14.0	.0	148.0	29.0
20 to 50	336.0	54.0	165.0	.0	81.0	.0	.0	.0	.0	.0	9.0	27.0
Total	2,687.0	392.0	566.0	.0	524.0	8.0	.0	10.0	308.0	.0	588.0	291.0
Total, Pacific Coast:												
120 +	6,869.0	2,720.0	174.0	.0	528.0	1,495.0	9.0	5.0	285.0	.0	1,245.0	408.0
85 to 120	2,235.2	772.0	366.0	.0	262.0	177.2	5.0	28.0	15.0	.0	472.0	138.0
50 to 85	2,561.0	732.0	701.0	.0	261.0	175.0	39.0	248.0	14.0	.0	268.0	123.0
20 to 50	863.0	184.0	408.0	.0	106.0	2.0	.0	45.0	.0	.0	59.0	59.0
Total	12,528.2	4,408.0	1,649.0	.0	1,157.0	1,849.2	53.0	326.0	314.0	.0	2,044.0	728.0
Northern Rocky Mtn.:												
120 +	236.2	70.7	9.5	30.7	45.9	27.6	45.8	6.0	.0	.0	.0	.0
85 to 120	366.3	67.5	72.3	20.8	126.9	31.0	36.3	1.4	.0	3.9	6.2	.0
50 to 85	876.8	234.5	256.4	12.5	161.0	52.7	95.1	24.6	.0	11.7	4.0	24.3
20 to 50	593.2	175.8	222.7	.0	14.2	30.8	22.5	99.6	.0	2.9	13.7	11.0
Total	2,072.5	548.5	560.9	64.0	348.0	142.1	199.7	131.6	.0	18.5	23.9	35.3
Southern Rocky Mtn.:												
120 +	.3	.0	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0
85 to 120	1.1	.0	.1	.0	1.0	.0	.0	.0	.0	.0	.0	.0
50 to 85	3.2	.0	1.4	.0	1.6	.0	.0	.2	.0	.0	.0	.0
20 to 50	18.4	.0	2.8	.0	2.4	.1	.0	12.5	.0	.0	.1	.5
Total	23.0	.0	4.3	.0	5.3	.1	.0	12.7	.0	.0	.1	.5
Total, Rocky Mtn.:												
120 +	236.5	70.7	9.5	30.7	46.2	27.6	45.8	6.0	.0	.0	.0	.0
85 to 120	367.4	67.5	72.4	20.8	127.9	31.0	36.3	1.4	.0	3.9	6.2	.0
50 to 85	880.0	234.5	257.8	12.5	162.6	52.7	95.1	24.8	.0	11.7	4.0	24.3
20 to 50	611.6	175.8	225.5	.0	16.6	30.9	22.5	112.1	.0	2.9	13.8	11.5
Total	2,095.5	548.5	565.2	64.0	353.3	142.2	199.7	144.3	.0	18.5	24.0	35.8
Total, western regions:												
120 +	7,105.5	2,790.7	183.5	30.7	574.2	1,522.6	54.8	11.0	285.0	.0	1,245.0	408.0
85 to 120	2,602.6	839.5	438.4	20.8	389.9	208.2	41.3	29.4	15.0	3.9	478.2	138.0
50 to 85	3,441.0	966.5	958.8	12.5	423.6	227.7	134.1	272.8	14.0	11.7	272.0	147.3
20 to 50	1,474.6	359.8	633.5	.0	122.6	32.9	22.5	157.1	.0	2.9	72.8	70.5
Total	14,623.7	4,956.5	2,214.2	64.0	1,510.3	1,991.4	252.7	470.3	314.0	18.5	2,068.0	763.8

Table 3.6—*Area of commercial timberland in the western United States, by ownership, forest type, productivity class, section, and region, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and productivity class	Farmer and other private: Total	Douglas-fir	Ponderosa pine	Western white pine	Fir-spruce	Hemlock-Sitka spruce	Larch	Lodgepole pine	Redwood	Other western softwoods	Western hardwoods	Nonstocked
Pacific Northwest:												
Douglas-fir subregion (Western Oregon and western Washington):												
120 +	2,528.0	1,042.0	13.0	.0	21.0	366.0	6.0	.0	.0	.0	937.0	143.0
85 to 120	986.0	325.0	8.0	.0	44.0	134.0	2.0	.0	.0	.0	342.0	131.0
50 to 85	759.0	258.0	24.0	.0	4.0	127.0	11.0	.0	.0	.0	239.0	96.0
20 to 50	254.0	44.0	17.0	.0	8.0	.0	.0	.0	.0	.0	122.0	63.0
Total	4,527.0	1,669.0	62.0	.0	77.0	627.0	19.0	.0	.0	.0	1,640.0	433.0
Pine subregion (Eastern Oregon and eastern Washington):												
120 +	225.0	13.0	40.0	6.0	106.0	.0	8.0	8.0	.0	.0	27.0	17.0
85 to 120	517.0	45.0	248.0	.0	60.0	16.0	20.0	25.0	.0	.0	47.0	56.0
50 to 85	1,875.0	812.0	453.0	.0	94.0	16.0	46.0	157.0	.0	.0	70.0	227.0
20 to 50	827.0	216.0	387.0	.0	9.0	.0	15.0	59.0	.0	.0	36.0	105.0
Total	3,444.0	1,086.0	1,128.0	6.0	269.0	32.0	89.0	249.0	.0	.0	180.0	405.0
Coastal Alaska:												
120 +	35.2	.0	.0	.0	.0	34.9	.0	.0	.0	.0	.2	.1
85 to 120	23.5	.0	.0	.0	.0	23.5	.0	.0	.0	.0	.0	.0
50 to 85	25.0	.0	.0	.0	.0	25.0	.0	.0	.0	.0	.0	.0
20 to 50	1.5	.0	.0	.0	.0	1.5	.0	.0	.0	.0	.0	.0
Total	85.2	.0	.0	.0	.0	84.9	.0	.0	.0	.0	.2	.1
Interior Alaska:												
120 +	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
85 to 120	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50 to 85	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20 to 50	203.4	.0	.0	.0	8.1	.0	.0	.0	.0	.0	195.3	.0
Total	203.4	.0	.0	.0	8.1	.0	.0	.0	.0	.0	195.3	.0
Total, Pacific Northwest:												
120 +	2,788.2	1,055.0	53.0	6.0	127.0	400.9	14.0	8.0	.0	.0	964.2	160.1
85 to 120	1,526.5	370.0	256.0	.0	104.0	173.5	22.0	25.0	.0	.0	389.0	187.0
50 to 85	2,659.0	1,070.0	477.0	.0	98.0	168.0	57.0	157.0	.0	.0	309.0	323.0
20 to 50	1,285.9	260.0	404.0	.0	25.1	1.5	15.0	59.0	.0	.0	353.3	168.0
Total	8,259.6	2,755.0	1,190.0	6.0	354.1	743.9	108.0	249.0	.0	.0	2,015.5	838.1
Pacific Southwest:												
120 +	1,913.0	156.0	191.0	.0	165.0	14.0	.0	.0	261.0	.0	659.0	467.0
85 to 120	1,058.0	135.0	212.0	.0	146.0	.0	.0	2.0	20.0	.0	426.0	117.0
50 to 85	1,530.0	320.0	393.0	.0	198.0	.0	.0	28.0	20.0	.0	475.0	96.0
20 to 50	934.0	73.0	446.0	.0	114.0	.0	.0	32.0	.0	.0	190.0	79.0
Total	5,435.0	684.0	1,242.0	.0	623.0	14.0	.0	62.0	301.0	.0	1,750.0	759.0
Total, Pacific Coast:												
120 +	4,701.2	1,211.0	244.0	6.0	292.0	414.9	14.0	8.0	261.0	.0	1,623.2	627.1
85 to 120	2,584.5	505.0	468.0	.0	250.0	173.5	22.0	27.0	20.0	.0	815.0	304.0
50 to 85	4,189.0	1,390.0	870.0	.0	296.0	168.0	57.0	185.0	20.0	.0	784.0	419.0
20 to 50	2,219.9	333.0	850.0	.0	139.1	1.5	15.0	91.0	.0	.0	543.3	247.0
Total	13,694.6	3,439.0	2,432.0	6.0	977.1	757.9	108.0	311.0	301.0	.0	3,765.5	1,597.1
Northern Rocky Mtn.:												
120 +	294.7	45.8	19.9	7.6	48.2	49.1	108.9	6.2	.0	.0	.0	9.0
85 to 120	694.3	243.6	134.8	13.1	108.0	56.3	78.3	39.4	.0	.5	.3	20.0
50 to 85	1,998.7	731.8	424.3	9.0	197.8	38.9	234.6	201.7	.0	13.9	58.3	88.4
20 to 50	3,596.5	847.2	1,475.6	.0	127.0	41.9	32.3	656.7	.0	16.7	264.0	135.1
Total	6,584.2	1,868.4	2,054.6	29.7	481.0	186.2	454.1	904.0	.0	31.1	322.6	252.5
Southern Rocky Mtn.:												
120 +	51.0	.0	27.7	.0	13.3	.0	.0	.0	.0	.0	10.0	.0
85 to 120	157.0	28.0	4.0	.0	55.0	.0	.0	1.7	.0	1.7	66.6	.0
50 to 85	929.9	198.3	297.2	.0	316.0	.0	.0	6.5	.0	13.0	98.9	.0
20 to 50	4,780.3	721.1	1,847.0	.0	274.0	.7	.0	387.3	.0	69.6	1,202.9	277.7
Total	5,918.2	947.4	2,175.9	.0	658.3	.7	.0	395.5	.0	84.3	1,378.4	277.7
Total, Rocky Mtn.:												
120 +	345.7	45.8	47.6	7.6	61.5	49.1	108.9	6.2	.0	.0	10.0	9.0
85 to 120	851.3	271.6	138.8	13.1	163.0	56.3	78.3	41.1	.0	2.2	66.9	20.0
50 to 85	2,928.6	930.1	721.5	9.0	513.8	38.9	234.6	208.2	.0	26.9	157.2	88.4
20 to 50	8,376.8	1,568.3	3,322.6	.0	401.0	42.6	32.3	1,044.0	.0	86.3	1,466.9	412.8
Total	12,502.4	2,815.8	4,230.5	29.7	1,139.3	186.9	454.1	1,299.5	.0	115.4	1,701.0	530.2
Total, western regions:												
120 +	5,046.9	1,256.8	291.6	13.6	353.5	464.0	122.9	14.2	261.0	.0	1,633.2	636.1
85 to 120	3,435.8	776.6	606.8	13.1	413.0	229.8	100.3	68.1	20.0	2.2	881.9	324.0
50 to 85	7,117.6	2,320.1	1,591.5	9.0	809.8	206.9	291.6	393.2	20.0	26.9	941.2	507.4
20 to 50	10,596.7	1,901.3	4,172.6	.0	540.1	44.1	47.3	1,135.0	.0	86.3	2,010.2	659.8
Total	26,197.0	6,254.8	6,662.5	35.7	2,116.4	944.8	562.1	1,610.5	301.0	115.4	5,466.5	2,127.3

Table 3.7—*Area of commercial timberland in the United States, by ownership and stand-size class, section, region, and State, January 1, 1977*

[Thousand acres]

Section, region and State	All ownerships					National Forest				
	Total	Sawtimber stands	Poletimber stands	Seedling sapling	Nonstocked areas	Total	Sawtimber stands	Poletimber stands	Seedling sapling	Nonstocked areas
New England:										
Connecticut	1,805.6	631.0	600.1	574.5	.0	.0	.0	.0	.0	.0
Maine	16,864.0	6,066.6	5,376.8	5,278.8	141.8	37.5	4.0	31.5	2.0	.0
Massachusetts	2,797.7	934.1	947.2	857.5	58.9	.0	.0	.0	.0	.0
New Hampshire	4,692.0	1,946.2	1,555.6	1,155.0	35.2	459.0	173.0	257.0	29.0	.0
Rhode Island	395.3	87.9	133.0	168.3	6.1	.0	.0	.0	.0	.0
Vermont	4,429.9	2,061.1	954.5	1,376.5	37.8	209.0	122.0	62.0	25.0	.0
Total	30,984.5	11,726.9	9,567.2	9,410.6	279.8	705.5	299.0	350.5	56.0	.0
Middle Atlantic:										
Delaware	384.4	207.1	83.3	94.0	.0	.0	.0	.0	.0	.0
Maryland	2,522.7	1,413.1	665.5	438.2	5.9	.0	.0	.0	.0	.0
New Jersey	1,856.8	463.7	388.1	943.6	61.4	.0	.0	.0	.0	.0
New York	14,243.3	4,215.1	2,635.6	6,091.0	1,301.6	.0	.0	.0	.0	.0
Pennsylvania	15,923.7	7,625.5	5,008.1	3,083.7	206.4	485.0	266.0	194.0	24.0	1.0
West Virginia	11,483.7	5,075.7	3,959.6	2,306.1	142.3	852.6	452.5	339.0	44.8	16.3
Total	46,414.6	19,000.2	12,740.2	12,956.6	1,717.6	1,337.6	718.5	533.0	68.8	17.3
Lake States:										
Michigan	18,778.2	4,608.7	8,271.5	5,325.8	572.2	2,401.0	342.0	1,439.0	581.0	39.0
Minnesota	13,695.1	3,134.9	6,956.1	3,434.8	169.3	1,715.1	311.9	1,045.1	324.7	33.4
North Dakota	405.0	63.6	157.5	149.1	34.8	.0	.0	.0	.0	.0
South Dakota (East)	223.0	103.8	96.2	19.7	3.3	.0	.0	.0	.0	.0
Wisconsin	14,478.0	3,275.1	6,584.2	4,293.0	325.7	1,266.0	261.0	761.0	224.0	20.0
Total	47,579.3	11,186.1	22,065.5	13,222.4	1,105.3	5,382.1	914.9	3,245.1	1,129.7	92.4
Central:										
Illinois	3,692.3	2,112.2	944.7	603.6	31.8	227.0	105.0	83.0	33.0	6.0
Indiana	3,815.0	2,027.9	818.1	890.2	78.8	162.0	73.0	56.0	27.0	6.0
Iowa	1,460.2	782.9	356.6	278.3	42.4	.0	.0	.0	.0	.0
Kansas	1,187.0	681.3	229.4	134.9	141.4	.0	.0	.0	.0	.0
Kentucky	11,901.9	5,544.3	3,006.1	3,305.3	46.2	588.8	413.1	148.2	27.5	.0
Missouri	12,288.6	3,983.7	4,927.5	2,454.0	923.4	1,246.0	302.3	644.0	290.2	9.5
Nebraska	788.8	197.4	230.8	69.7	290.9	41.0	1.8	10.6	6.8	21.8
Ohio	6,028.8	1,856.0	657.1	3,350.5	165.2	141.0	56.0	60.0	17.0	8.0
Total	41,162.6	17,185.7	11,170.3	11,086.5	1,720.1	2,405.8	951.2	1,001.8	401.5	51.3
Total, North	166,141.0	59,098.9	55,543.2	46,676.1	4,822.8	9,831.0	2,883.6	5,130.4	1,656.0	161.0
South Atlantic:										
North Carolina	19,562.2	8,222.4	6,297.0	4,554.5	488.3	1,028.8	630.4	283.8	86.8	27.8
South Carolina	12,176.1	4,824.7	3,388.4	3,573.2	389.8	572.8	382.6	142.4	47.8	.0
Virginia	15,938.8	6,339.3	5,991.0	3,356.4	252.1	1,424.0	654.6	569.7	168.4	31.3
Total	47,677.1	19,386.4	15,676.4	11,484.1	1,130.2	3,025.6	1,667.6	995.9	303.0	59.1
East Gulf:										
Florida	15,330.0	4,717.6	3,912.0	4,329.8	2,370.6	1,005.3	407.2	296.6	236.9	64.6
Georgia	24,812.3	8,773.6	9,030.7	6,349.2	658.8	812.6	542.4	227.9	42.3	.0
Total	40,142.3	13,491.2	12,942.7	10,679.0	3,029.4	1,817.9	949.6	524.5	279.2	64.6
Central Gulf:										
Alabama	21,333.1	6,839.5	7,141.9	7,242.5	109.2	617.8	297.0	199.9	120.9	.0
Mississippi	16,504.3	7,421.7	4,806.7	4,121.0	154.9	1,122.0	765.9	136.6	219.5	.0
Tennessee	12,819.8	3,297.8	4,893.6	4,595.9	32.5	578.7	248.0	222.5	108.2	.0
Total	50,657.2	17,559.0	16,842.2	15,959.4	296.6	2,318.5	1,310.9	559.0	448.6	.0
West Gulf:										
Arkansas	18,206.7	5,443.4	4,759.5	7,922.1	81.7	2,413.7	743.5	875.9	794.3	.0
Louisiana	14,526.6	7,880.5	3,409.8	2,911.1	325.2	559.6	402.6	65.8	91.2	.0
Oklahoma	4,323.4	1,028.6	1,483.1	1,642.7	169.0	224.4	115.1	77.2	25.6	6.5
Texas	12,512.5	6,456.9	3,202.3	2,687.6	165.7	595.0	489.7	34.2	70.7	.4
Total	49,569.2	20,809.4	12,854.7	15,163.5	741.6	3,792.7	1,750.9	1,053.1	981.8	6.9
Total, South	188,045.8	71,246.0	58,316.0	53,286.0	5,197.8	10,954.7	5,679.0	3,132.5	2,012.6	130.6
Pacific Northwest:										
Alaska:										
Coastal	7,040.2	6,533.0	108.4	362.3	36.5	6,528.7	6,060.8	93.1	341.6	33.2
Interior	4,109.9	1,716.3	1,297.8	1,047.0	48.8	.0	.0	.0	.0	.0
Summary	11,150.1	8,249.3	1,406.2	1,409.3	85.3	6,528.7	6,060.8	93.1	341.6	33.2
Oregon:										
Western	13,651.0	8,666.0	1,592.0	2,470.0	923.0	4,587.0	3,628.0	429.0	391.0	139.0
Eastern	10,560.0	6,739.0	2,389.0	1,080.0	352.0	7,046.0	4,691.0	1,587.0	610.0	158.0
Summary	24,211.0	15,405.0	3,981.0	3,550.0	1,275.0	11,633.0	8,319.0	2,016.0	1,001.0	297.0
Washington:										
Western	9,788.0	6,074.0	1,473.0	2,008.0	233.0	2,200.0	1,653.0	168.0	292.0	87.0
Eastern	8,134.0	4,751.0	1,742.0	1,153.0	488.0	2,967.0	1,802.0	667.0	453.0	45.0
Summary	17,922.0	10,825.0	3,215.0	3,161.0	721.0	5,167.0	3,455.0	835.0	745.0	132.0
Total	53,283.1	34,479.3	8,602.2	8,120.3	2,081.3	23,328.7	17,834.8	2,944.1	2,087.6	462.2

Table 3.7—*Area of commercial timberland in the United States, by ownership and stand-size class, section, region, and State, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and State	All ownerships: Total	All ownerships: Sawtimber stands	All ownerships: Poletimber stands	All ownerships: Seedling sapling	All ownerships: Nonstocked areas	National Forest: Total	National Forest: Sawtimber stands	National Forest: Poletimber stands	National Forest: Seedling sapling	National Forest: Nonstocked areas
Pacific Southwest:										
California	16,303.0	11,862.0	1,376.0	1,979.0	1,086.0	8,168.0	6,367.0	993.0	491.0	317.0
Hawaii	948.0	204.0	64.0	16.0	664.0	.0	.0	.0	.0	.0
Total	17,251.0	12,066.0	1,440.0	1,995.0	1,750.0	8,168.0	6,367.0	993.0	491.0	317.0
Total, Pacific Coast	70,534.1	46,545.3	10,042.2	10,115.3	3,831.3	31,496.7	24,201.8	3,937.1	2,578.6	779.2
Northern Rocky Mountain:										
Idaho	13,540.6	9,618.6	1,883.3	1,536.3	502.4	9,153.2	6,234.1	1,592.8	1,039.2	287.1
Montana	14,359.4	9,013.1	3,731.9	1,387.5	226.9	8,161.8	4,995.2	2,165.2	896.0	105.4
South Dakota (West)	1,244.1	845.1	305.2	85.4	8.4	952.5	674.9	238.3	37.3	2.0
Wyoming	4,334.2	2,806.2	980.0	345.5	202.5	3,044.7	1,947.3	643.0	296.6	157.8
Total	33,478.3	22,283.0	6,900.4	3,354.7	940.2	21,312.2	13,851.5	4,639.3	2,269.1	552.3
Southern Rocky Mountain:										
Arizona	3,895.6	3,403.4	213.1	157.9	121.2	2,461.5	2,031.7	176.0	136.8	117.0
Colorado	11,314.7	5,811.1	3,434.6	851.1	1,217.9	7,505.8	4,143.9	1,718.1	696.5	947.3
Nevada	134.3	116.5	3.3	7.2	7.3	61.1	47.8	3.3	5.4	4.6
New Mexico	5,537.5	4,622.2	387.8	322.9	204.6	2,818.3	2,205.2	239.4	172.1	201.6
Utah	3,404.6	2,309.3	769.3	260.9	65.1	2,277.0	1,597.1	501.7	132.7	45.5
Total	24,286.7	16,262.5	4,808.1	1,600.0	1,616.1	15,123.7	10,025.7	2,638.5	1,143.5	1,316.0
Total, Rocky Mountain	57,765.0	38,545.5	11,708.5	4,954.7	2,556.3	36,435.9	23,877.2	7,277.8	3,412.6	1,868.3
Total, all regions	482,485.9	215,435.7	135,609.9	115,032.1	16,408.2	88,718.3	56,641.6	19,477.8	9,659.8	2,939.1

Section, region and State	Other public: Total	Other public: Sawtimber stands	Other public: Poletimber stands	Other public: Seedling sapling	Other public: Nonstocked areas	Forest industry: Total	Forest industry: Sawtimber stands	Forest industry: Poletimber stands	Forest industry: Seedling sapling	Forest industry: Nonstocked areas	Farmer and other private: Total	Farmer and other private: Sawtimber stands	Farmer and other private: Poletimber stands	Farmer and other private: Seedling sapling	Farmer and other private: Nonstocked areas
New England:															
Connecticut	146.6	64.8	55.4	26.4	.0	.0	.0	.0	.0	.0	1,659.0	566.2	544.7	548.1	.0
Maine	503.5	57.5	266.4	179.2	4	8,082.8	3,607.3	2,831.9	1,643.6	.0	8,240.2	2,397.8	2,247.0	3,454.0	141.4
Massachusetts	365.4	138.1	113.0	102.5	11.8	30.1	.0	30.1	.0	.0	2,402.2	796.0	804.1	755.0	47.1
New Hampshire	120.7	58.7	39.4	22.6	.0	946.9	362.0	383.2	201.7	.0	3,165.4	1,352.5	876.0	901.7	35.2
Rhode Island	32.1	5.3	5.4	21.4	.0	.0	.0	.0	.0	.0	363.2	82.6	127.6	146.9	6.1
Vermont	213.0	124.6	41.1	47.3	.0	666.3	443.8	111.7	110.8	.0	3,341.6	1,370.7	739.7	1,193.4	37.8
Total	1,381.3	449.0	520.7	399.4	12.2	9,726.1	4,413.1	3,356.9	1,956.1	.0	19,171.6	6,565.8	5,339.1	6,999.1	267.6
Middle Atlantic:															
Delaware	14.0	10.6	1.6	1.8	.0	29.7	13.2	6.6	9.9	.0	340.7	183.3	75.1	82.3	.0
Maryland	242.7	139.2	72.7	30.8	.0	139.2	48.9	47.3	43.0	.0	2,140.8	1,225.0	545.5	364.4	5.9
New Jersey	318.9	76.6	68.5	160.1	13.7	16.3	5.8	10.5	.0	.0	1,521.6	381.3	309.1	783.5	47.7
New York	892.0	278.7	272.1	269.7	71.5	1,177.0	592.5	238.1	323.0	23.4	12,174.3	3,343.9	2,125.4	5,498.3	1,206.7
Pennsylvania	2,985.9	1,852.9	900.8	232.2	.0	964.1	572.0	268.7	123.4	.0	11,488.7	4,934.6	3,644.6	2,704.1	205.4
West Virginia	268.2	84.2	143.0	36.0	5.0	879.7	580.6	212.1	87.0	0	9,483.2	3,958.4	3,265.5	2,138.3	121.0
Total	4,721.7	2,442.2	1,458.7	730.6	90.2	3,206.0	1,813.0	783.3	586.3	23.4	37,149.3	14,026.5	9,965.2	11,570.9	1,586.7
Lake States:															
Michigan	4,018.1	892.7	2,031.8	980.7	112.9	2,256.7	1,000.5	693.1	553.9	9.2	10,102.4	2,373.5	4,107.6	3,210.2	411.1
Minnesota	5,613.4	1,033.5	2,879.3	1,629.9	70.7	772.0	154.4	354.6	254.8	8.2	5,594.6	1,635.1	2,677.1	1,225.4	57.0
North Dakota	123.7	19.9	47.6	46.1	10.1	.0	.0	.0	.0	.0	281.3	43.7	109.9	103.0	24.7
South Dakota (East)	77.3	31.0	41.6	4.7	.0	.0	.0	.0	.0	.0	145.7	72.8	54.6	15.0	3.3
Wisconsin	3,420.5	461.3	1,725.9	1,168.7	64.6	1,148.1	290.6	502.5	351.0	4.0	8,643.4	2,262.2	3,594.8	2,549.3	237.1
Total	13,253.0	2,438.4	6,726.2	3,830.1	258.3	4,176.8	1,445.5	1,550.2	1,159.7	21.4	24,767.4	6,387.3	10,544.0	7,102.9	733.2
Central:															
Illinois	52.6	26.9	11.8	10.0	3.9	16.7	16.7	.0	.0	.0	3,396.0	1,963.6	849.9	560.6	21.9
Indiana	248.0	146.3	54.2	47.5	.0	27.0	14.8	8.2	4.0	.0	3,378.0	1,793.8	699.7	811.7	72.8
Iowa	112.7	70.9	21.1	17.2	3.5	16.7	8.6	4.4	3.2	.5	1,330.8	703.4	331.1	257.9	38.4
Kansas	36.5	20.7	8.4	2.9	4.5	.0	.0	.0	.0	.0	1,150.5	660.6	221.0	132.0	136.9
Kentucky	306.5	115.8	120.5	70.2	.0	255.1	71.9	150.5	32.7	.0	10,751.5	4,943.5	2,586.9	3,174.9	46.2
Missouri	285.9	84.8	104.3	75.9	20.9	362.3	115.6	132.8	110.4	3.5	10,394.4	3,481.0	4,046.4	1,977.5	889.5
Nebraska	37.8	10.6	16.3	8.3	2.6	.0	.0	.0	.0	.0	710.0	185.0	203.9	54.6	266.5
Ohio	245.6	125.1	35.8	81.5	3.2	126.8	59.4	14.9	52.5	.0	5,515.4	1,615.5	546.4	3,199.5	154.0
Total	1,325.6	601.1	372.4	313.5	38.6	804.6	287.0	310.8	202.8	4.0	36,626.6	15,346.4	9,485.3	10,168.7	1,626.2
Total, North	20,681.6	5,930.7	9,078.0	5,273.6	399.3	17,913.5	7,958.6	6,001.2	3,904.9	48.8	117,714.9	42,326.0	35,333.6	35,841.6	4,213.7
South Atlantic:															
North Carolina	734.0	315.5	214.2	162.3	42.0	2,134.8	546.4	548.5	953.6	86.3	15,664.6	6,730.1	5,250.5	3,351.8	332.2
South Carolina	522.3	213.6	132.9	153.4	22.4	2,006.9	862.6	501.3	601.5	41.5	9,074.1	3,365.9	2,611.8	2,770.5	325.9
Virginia	498.0	257.1	172.9	59.3	8.7	1,669.6	483.4	517.7	632.5	36.0	12,347.2	4,944.2	4,730.7	2,496.2	176.1
Total	1,754.3	786.2	520.0	375.0	73.1	5,811.3	1,892.4	1,567.5	2,187.6	163.8	37,085.9	15,040.2	12,593.0	8,618.5	834.2

Table 3.7—*Area of commercial timberland in the United States, by ownership and stand-size class, section, region, and State, January 1, 1977—Cont'd.*

[Thousand acres]

Section, region and State	Other public					Forest industry					Farmer and other private				
	Total	Saw-timber stands	Pole-timber stands	Seed-ling sapling	Non-stock-ed areas	Total	Saw-timber stands	Pole-timber stands	Seed-ling sapling	non-stock-ed areas	Total	Saw-timber stands	Pole-timber stands	Seed-ling sapling	Non-stock-ed areas
East Gulf:															
Florida	1,110.2	406.1	203.0	243.5	257.6	5,318.6	1,568.1	1,337.7	1,982.3	430.5	7,895.9	2,336.2	2,074.7	1,867.1	1,617.9
Georgia	732.2	347.3	192.2	159.3	33.4	4,318.2	1,304.2	1,276.7	1,598.9	138.4	18,949.3	6,579.7	7,333.9	4,548.7	487.0
Total	1,842.4	753.4	395.2	402.8	291.0	9,636.8	2,872.3	2,614.4	3,581.2	568.9	26,845.2	8,915.9	9,408.6	6,415.8	2,104.9
Central Gulf:															
Alabama	391.0	113.9	122.1	155.0	.0	4,204.9	1,517.7	1,214.0	1,449.8	23.4	16,119.4	4,910.9	5,605.9	5,516.8	85.8
Mississippi	554.4	339.0	104.0	111.4	.0	2,996.1	1,211.9	757.0	996.2	31.0	11,831.8	5,104.9	3,809.1	2,793.9	123.9
Tennessee	686.5	297.8	271.5	117.2	.0	1,121.4	233.2	432.2	456.0	.0	10,433.2	2,518.8	3,967.4	3,914.5	32.5
Total	1,631.9	750.7	497.6	383.6	.0	8,322.4	2,962.8	2,403.2	2,902.0	54.4	38,384.4	12,534.6	13,382.4	12,225.2	242.2
West Gulf:															
Arkansas	560.3	220.7	119.1	214.9	5.6	3,950.7	1,863.8	745.2	1,322.4	19.3	11,282.0	2,615.4	3,019.3	5,590.5	56.8
Louisana	442.5	294.5	73.5	66.7	7.8	3,761.4	2,056.1	722.8	946.8	35.7	9,763.1	5,127.3	2,547.7	1,806.4	281.7
Oklahoma	343.8	88.0	103.2	152.6	.0	991.3	368.3	316.6	306.4	.0	2,763.9	457.2	986.1	1,158.1	162.5
Texas	200.7	91.3	81.3	28.1	.0	3,771.1	2,189.6	761.1	808.3	12.1	7,945.7	3,686.3	2,325.7	1,780.5	153.2
Total	1,547.3	694.5	377.1	462.3	13.4	12,474.5	6,477.8	2,545.7	3,383.9	67.1	31,754.7	11,886.2	8,878.8	10,335.5	654.2
Total, South	6,775.9	2,984.8	1,789.9	1,623.7	377.5	36,245.0	14,205.3	9,130.8	12,054.7	854.2	134,070.2	48,376.9	44,262.8	37,595.0	3,835.5
Pacific Northwest:															
Alaska:															
Coastal	426.1	390.8	14.7	17.4	3.2	.2	.2	.0	.0	.0	85.2	81.2	.6	3.3	.1
Interior	3,906.5	1,679.7	1,242.5	935.5	48.8	.0	.0	.0	.0	.0	203.4	36.6	55.3	111.5	.0
Summary	4,332.6	2,070.5	1,257.2	952.9	52.0	.2	.2	.0	.0	.0	288.6	117.8	55.9	114.8	.1
Oregon:															
Western	2,858.0	1,922.0	274.0	534.0	128.0	3,895.0	1,973.0	492.0	1,159.0	271.0	2,311.0	1,143.0	397.0	386.0	385.0
Eastern	636.0	424.0	131.0	55.0	26.0	1,627.0	1,018.0	333.0	203.0	73.0	1,251.0	606.0	338.0	212.0	95.0
Summary	3,494.0	2,346.0	405.0	589.0	154.0	5,522.0	2,991.0	825.0	1,362.0	344.0	3,562.0	1,749.0	735.0	598.0	480.0
Washington:															
Western	1,791.0	1,118.0	303.0	338.0	32.0	3,581.0	2,042.0	536.0	937.0	66.0	2,216.0	1,261.0	466.0	441.0	48.0
Eastern	2,236.0	1,538.0	335.0	257.0	106.0	738.0	491.0	122.0	98.0	27.0	2,193.0	920.0	618.0	345.0	310.0
Summary	4,027.0	2,656.0	638.0	595.0	138.0	4,319.0	2,533.0	658.0	1,035.0	93.0	4,409.0	2,181.0	1,084.0	786.0	358.0
Total	11,853.6	7,072.5	2,300.2	2,136.9	344.0	9,841.2	5,524.2	1,483.0	2,397.0	437.0	8,259.6	4,047.8	1,874.9	1,498.8	838.1
Pacific Southwest:															
California	507.0	339.0	33.0	70.0	65.0	2,687.0	1,866.0	72.0	458.0	291.0	4,941.0	3,290.0	278.0	960.0	413.0
Hawaii	454.0	98.0	30.0	8.0	318.0	.0	.0	.0	.0	.0	494.0	106.0	34.0	8.0	346.0
Total	961.0	437.0	63.0	78.0	383.0	2,687.0	1,866.0	72.0	458.0	291.0	5,435.0	3,396.0	312.0	968.0	759.0
Total, Pacific Coast	12,814.6	7,509.5	2,363.2	2,214.9	727.0	12,528.2	7,390.2	1,555.0	2,855.0	728.0	13,694.6	7,443.8	2,186.9	2,466.8	1,597.1
Northern Rocky Mountain:															
Idaho	1,366.6	1,093.8	108.7	129.5	34.6	946.7	813.1	21.5	89.6	22.5	2,074.1	1,477.6	160.3	278.0	158.2
Montana	1,632.2	1,055.5	395.8	147.7	33.2	1,055.4	824.0	181.1	38.3	12.0	3,510.0	2,138.4	989.8	305.5	76.3
South Dakota (West)	76.2	47.8	12.0	14.9	1.5	16.1	9.9	4.5	1.7	.0	199.3	112.5	50.4	31.5	4.9
Wyoming	434.4	283.0	99.7	20.9	30.8	54.3	38.2	13.9	1.4	.8	800.8	537.7	223.4	26.6	13.1
Total:	3,509.4	2,480.1	616.2	313.0	100.1	2,072.5	1,685.2	221.0	131.0	35.3	6,584.2	4,266.2	1,423.9	641.6	252.5
Southern Rocky Mountain:															
Arizona	1,267.8	1,236.6	23.1	3.9	4.2	.0	.0	.0	.0	.0	166.3	135.1	14.0	17.2	.0
Colorado	690.5	392.2	273.6	18.3	6.4	14.7	4.0	10.3	.4	.0	3,103.7	1,271.0	1,432.6	135.9	264.2
Nevada	4.6	4.4	.0	.1	.1	8.3	7.5	.0	.3	.5	60.3	56.8	.0	1.4	2.1
New Mexico	792.1	754.3	16.8	18.0	3.0	.0	.0	.0	.0	.0	1,927.1	1,662.7	131.6	132.8	.0
Utah	466.8	320.6	87.1	50.9	8.2	.0	.0	.0	.0	.0	660.8	391.6	180.5	77.3	11.4
Total	3,221.8	2,708.1	400.6	91.2	21.9	23.0	11.5	10.3	.7	.5	5,918.2	3,517.2	1,758.7	364.6	277.7
Total, Rocky Mountain	6,731.2	5,188.2	1,016.8	404.2	122.0	2,095.5	1,696.7	231.3	131.7	35.8	12,502.4	7,783.4	3,182.6	1,006.2	530.2
Total, all regions	47,003.3	21,613.2	14,247.9	9,516.4	1,625.8	68,782.2	31,250.8	16,918.3	18,946.3	1,666.8	277,982.1	105,930.1	84,965.9	76,909.6	10,176.5

Table 3.8—*Net volume of timber on commercial timberland in the United States, by class of timber, softwoods and hardwoods, section, region, and State, January 1, 1977*

[Million cubic feet]

Section, region and State	All timber			Growing-stock trees: Total			Sawtimber trees			Saw log portion			Upperstem portion			Poletimber trees		
	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood	Total	Soft wood	Hard wood
New England:																		
Connecticut	2,849.3	464.4	2,384.9	2,662.4	425.0	2,237.4	1,463.2	309.6	1,153.6	1,203.1	275.5	927.6	260.1	34.1	226.0	1,199.2	115.4	1,083.8
Maine	25,543.6	17,542.6	8,001.0	22,603.7	16,060.3	6,543.4	9,546.6	6,864.0	2,682.6	8,138.8	5,989.6	2,149.2	1,407.8	874.4	533.4	13,057.1	9,196.3	3,860.8
Massachusetts	4,479.1	1,596.0	2,883.1	3,893.0	1,438.7	2,454.3	2,010.2	1,018.8	991.4	1,689.6	902.2	787.4	320.6	116.6	204.0	1,882.8	419.9	1,462.9
New Hampshire	8,238.6	3,827.0	4,411.6	7,286.2	3,525.8	3,760.4	3,620.2	2,171.7	1,448.5	3,069.4	1,917.2	1,152.2	550.8	254.5	296.3	3,666.0	1,354.1	2,311.9
Rhode Island	480.4	116.8	363.6	412.0	107.9	304.1	192.2	70.8	121.4	159.2	62.7	96.5	33.0	8.1	24.9	219.8	37.1	182.7
Vermont	6,228.1	2,157.6	4,070.5	4,990.3	1,825.6	3,164.7	2,553.5	1,055.3	1,498.2	2,121.9	924.0	1,197.9	431.6	131.3	300.3	2,436.8	770.3	1,666.5
Total	47,819.1	25,704.4	22,114.7	41,847.6	23,383.3	18,464.3	19,385.9	11,490.2	7,895.7	16,382.0	10,071.2	6,310.8	3,003.9	1,419.0	1,584.9	22,461.7	11,893.1	10,568.6
Middle Atlantic:																		
Delaware	662.4	170.8	491.6	624.7	168.5	456.2	400.7	136.4	264.3	334.2	120.3	213.9	66.5	16.1	50.4	224.0	32.1	191.9
Maryland	3,888.8	817.2	3,071.6	3,492.1	793.0	2,699.1	2,321.0	530.2	1,790.8	1,927.4	465.2	1,462.2	393.6	65.0	328.6	1,171.1	262.8	908.3
New Jersey	1,670.6	271.6	1,399.0	1,533.5	251.4	1,282.1	798.3	155.8	642.5	660.4	135.8	524.6	137.9	20.0	117.9	735.2	95.6	639.6
New York	16,025.7	4,091.7	11,934.0	13,255.6	3,523.1	9,732.5	6,528.3	2,004.2	4,524.1	5,403.4	1,769.4	3,634.0	1,124.9	234.8	890.1	6,727.3	1,518.9	5,208.4
Pennsylvania	26,210.7	1,993.6	24,217.1	23,402.8	1,778.1	21,624.7	10,591.4	980.1	9,611.3	8,749.1	868.8	7,880.3	1,842.3	111.3	1,731.0	12,811.4	798.0	12,013.4
West Virginia	16,308.9	1,189.7	15,119.2	14,152.7	1,091.8	13,060.9	8,407.2	798.8	7,608.4	6,879.6	701.5	6,178.1	1,527.6	97.3	1,430.3	5,745.5	293.0	5,452.5
Total	64,767.1	8,534.6	56,232.5	56,461.4	7,605.9	48,855.5	29,046.9	4,605.5	24,441.4	23,954.1	4,061.0	19,893.1	5,092.8	544.5	4,548.3	27,414.5	3,000.4	24,414.1
Lake States:																		
Michigan	20,778.5	5,268.4	15,510.1	19,214.2	5,060.7	14,153.5	8,284.0	2,552.0	5,732.0	7,041.4	2,169.2	4,872.2	1,242.6	382.8	859.8	10,930.2	2,508.7	8,421.5
Minnesota	12,952.9	3,730.8	9,222.1	11,454.0	3,477.0	7,977.0	4,732.2	1,718.6	3,013.6	3,499.4	1,292.4	2,207.0	1,232.8	426.2	806.6	6,721.8	1,758.4	4,963.4
North Dakota	356.4	.1	356.3	257.4	.1	257.3	98.9	.0	98.9	81.4	.0	81.4	17.5	.0	17.5	158.5	.1	158.4
South Dakota (East)	173.0	23.8	149.2	133.7	22.8	110.9	85.8	12.2	73.6	72.9	10.4	62.5	12.9	1.8	11.1	47.9	10.6	37.3
Wisconsin	14,823.7	3,472.9	11,350.8	13,457.4	3,340.1	10,117.3	6,390.6	1,781.2	4,609.4	5,223.6	1,471.0	3,752.6	1,167.0	310.2	856.8	7,066.8	1,558.9	5,507.9
Total	49,084.5	12,496.0	36,588.5	44,516.7	11,900.7	32,616.0	19,591.5	6,064.0	13,527.5	15,918.7	4,943.0	10,975.7	3,672.8	1,121.0	2,551.8	24,925.2	5,836.7	19,088.5
Central:																		
Illinois	2,242.9	23.9	2,219.0	2,179.8	23.8	2,156.0	1,275.6	10.4	1,265.2	1,100.6	10.4	1,090.2	175.0	.0	175.0	904.2	13.4	890.8
Indiana	4,188.2	92.3	4,095.9	3,758.0	87.0	3,671.0	2,394.0	49.5	2,344.5	2,034.9	42.0	1,992.9	359.1	7.5	351.6	1,364.0	37.5	1,326.5
Iowa	1,341.9	10.4	1,331.5	1,038.1	6.2	1,031.9	691.9	3.5	688.4	469.4	2.5	466.9	222.5	1.0	221.5	346.2	2.7	343.5
Kansas	983.9	2.1	981.8	584.4	.6	583.8	412.4	.2	412.2	350.5	.2	350.3	61.9	.0	61.9	172.0	.4	171.6
Kentucky	13,191.6	1,022.6	12,169.0	11,967.6	916.0	11,051.6	7,366.7	583.4	6,783.3	6,018.5	508.8	5,509.7	1,348.2	74.6	1,273.6	4,600.9	332.6	4,268.3
Missouri	9,163.9	439.3	8,724.6	6,021.9	392.2	5,629.7	3,095.4	231.8	2,863.6	2,179.4	184.4	1,995.0	916.0	47.4	868.6	2,926.5	160.4	2,766.1
Nebraska	563.7	130.9	432.8	441.7	119.0	322.7	344.8	96.6	248.2	270.8	84.5	186.3	74.0	12.1	61.9	96.9	22.4	74.5
Ohio	5,024.9	149.9	4,875.0	4,327.7	139.4	4,188.3	2,660.8	76.2	2,584.6	2,170.6	66.2	2,104.4	490.2	10.0	480.2	1,666.9	63.2	1,603.7
Total	36,701.0	1,871.4	34,829.6	30,319.2	1,684.2	28,635.0	18,241.6	1,051.6	17,190.0	14,594.7	899.0	13,695.7	3,646.9	152.6	3,494.3	12,077.6	632.6	11,445.0
Total, North	198,371.7	48,606.4	149,765.3	173,144.9	44,574.1	128,570.8	86,265.9	23,211.3	63,054.6	70,849.5	19,974.2	50,875.3	15,416.4	3,237.1	12,179.3	86,879.0	21,362.8	65,516.2
South Atlantic:																		
North Carolina	29,191.7	10,970.8	18,220.9	26,130.7	10,741.7	15,389.0	17,217.6	7,653.8	9,563.8	14,958.6	6,875.5	8,083.1	2,259.0	778.3	1,480.7	8,913.1	3,087.9	5,825.2
South Carolina	16,738.9	7,351.3	9,387.6	14,200.6	7,079.2	7,121.4	10,280.4	5,366.8	4,913.6	9,347.4	4,995.2	4,352.2	933.0	371.6	561.4	3,920.2	1,712.4	2,207.8
Virginia	23,192.1	5,730.2	17,461.9	19,656.5	5,512.1	14,144.4	12,408.9	3,557.7	8,851.2	10,358.1	3,002.7	7,355.4	2,050.8	555.0	1,495.8	7,247.6	1,954.4	5,293.2
Total	69,122.7	24,052.3	45,070.4	59,987.8	23,333.0	36,654.8	39,906.9	16,578.3	23,328.6	34,664.1	14,873.4	19,790.7	5,242.8	1,704.9	3,537.9	20,080.9	6,754.7	13,326.2
East Gulf:																		
Florida	13,510.8	7,737.9	5,772.9	11,732.7	7,524.7	4,208.0	7,237.2	4,636.7	2,600.5	6,485.6	4,219.3	2,266.3	751.6	417.4	334.2	4,495.5	2,888.0	1,607.5
Georgia	31,359.2	17,165.9	14,193.3	28,401.7	16,880.3	11,521.4	17,657.0	11,256.0	6,401.0	15,758.0	10,271.4	5,486.6	1,899.0	984.6	914.4	10,744.7	5,624.3	5,120.4
Total	44,870.0	24,903.8	19,966.2	40,134.4	24,405.0	15,729.4	24,894.2	15,892.7	9,001.5	22,243.6	14,490.7	7,752.9	2,650.6	1,402.0	1,248.6	15,240.2	8,512.3	6,727.9
Central Gulf:																		
Alabama	24,704.1	12,629.3	12,074.8	22,239.8	12,339.3	9,900.5	13,504.0	8,517.9	4,986.1	11,316.3	7,452.7	3,863.6	2,187.7	1,065.2	1,122.5	8,735.8	3,821.4	4,914.4
Mississippi	19,552.2	9,163.0	10,389.2	17,233.7	8,929.1	8,304.6	11,704.8	6,724.3	4,980.5	10,241.2	6,043.0	4,198.2	1,463.6	681.3	782.3	5,528.9	2,204.8	3,324.1
Tennessee	14,581.8	2,376.7	12,205.1	12,503.9	2,287.0	10,216.9	7,184.0	1,330.7	5,853.3	5,622.3	1,145.1	4,477.2	1,561.7	185.6	1,376.1	5,319.9	956.3	4,363.6
Total	58,838.1	24,169.0	34,669.1	51,977.4	23,555.4	28,422.0	32,392.8	16,572.9	15,819.9	27,179.8	14,640.8	12,539.0	5,213.0	1,932.1	3,280.9	19,584.6	6,982.5	12,602.1

Table 3.8—*Net volume of timber on commercial timberland in the United States, by class of timber, softwoods and hardwoods, section, region, and State, January 1, 1977—Cont'd.*

[Million cubic feet]

Section, region and State	All timber			Growing-stock trees															
				Total			Sawtimber trees									Poletimber trees			
										Saw log portion			Upperstem portion						
	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood
West Gulf:																		
Arkansas	19,976.1	7,158.7	12,817.4	17,145.2	7,059.7	10,085.5	10,430.7	5,243.8	5,186.9	8,562.1	4,734.2	3,827.9	1,868.6	509.6	1,359.0	6,714.5	1,815.9	4,898.6
Louisiana	20,012.6	9,673.6	10,339.0	17,430.9	9,417.1	8,013.8	12,639.0	7,428.8	5,210.2	10,774.4	6,565.7	4,208.7	1,864.6	863.1	1,001.5	4,791.9	1,988.3	2,803.6
Oklahoma	2,784.1	1,028.5	1,755.6	2,061.5	1,010.4	1,051.1	1,242.2	742.5	499.7	1,100.6	669.6	431.0	141.6	72.9	68.7	819.3	267.9	551.4
Texas	15,265.0	8,477.9	6,787.1	13,272.1	8,355.7	4,916.4	9,625.4	6,788.8	2,836.6	8,525.6	6,163.7	2,361.9	1,099.8	625.1	474.7	3,646.7	1,566.9	2,079.8
Total	58,037.8	26,338.7	31,699.1	49,909.7	25,842.9	24,066.8	33,937.3	20,203.9	13,733.4	28,962.7	18,133.2	10,829.5	4,974.6	2,070.7	2,903.9	15,972.4	5,639.0	10,333.4
Total, South	230,868.6	99,463.8	131,404.8	202,009.3	97,136.3	104,873.0	131,131.2	69,247.8	61,883.4	113,050.2	62,138.1	50,912.1	18,081.0	7,109.7	10,971.3	70,878.1	27,888.5	42,989.6
Pacific Northwest:																		
Alaska:																		
Coastal	41,052.8	40,655.7	397.1	38,573.5	38,188.9	384.6	37,004.0	36,720.7	283.3	36,032.0	35,760.1	271.9	972.0	960.6	11.4	1,569.5	1,468.2	101.3
Interior	4,653.1	2,490.3	2,162.8	4,499.2	2,431.0	2,068.2	2,626.6	1,804.4	822.2	2,369.6	1,614.1	755.5	257.0	190.3	66.7	1,872.6	626.6	1,246.0
Summary	45,705.9	43,146.0	2,559.9	43,072.7	40,619.9	2,452.8	39,630.6	38,525.1	1,105.5	38,401.6	37,374.2	1,027.4	1,229.0	1,150.9	78.1	3,442.1	2,094.8	1,347.3
Oregon:																		
Western	61,619.0	55,640.0	5,979.0	57,397.0	52,603.0	4,794.0	52,615.0	49,543.0	3,072.0	50,531.0	47,367.0	2,664.0	2,084.0	1,676.0	408.0	4,782.0	3,060.0	1,722.0
Eastern	23,157.0	23,109.0	48.0	22,157.0	22,132.0	25.0	18,164.0	18,149.0	15.0	17,472.0	17,459.0	13.0	692.0	690.0	2.0	3,993.0	3,983.0	10.0
Summary	84,776.0	78,749.0	6,027.0	79,554.0	74,735.0	4,819.0	70,779.0	67,692.0	3,087.0	68,003.0	65,326.0	2,677.0	2,776.0	2,366.0	410.0	8,775.0	7,043.0	1,732.0
Washington:																		
Western	50,336.0	44,423.0	5,913.0	46,614.0	41,082.0	5,532.0	40,995.0	37,931.0	3,064.0	37,426.0	35,038.0	2,388.0	3,569.0	2,893.0	676.0	5,619.0	3,151.0	2,468.0
Eastern	17,672.0	17,430.0	242.0	16,889.0	16,718.0	171.0	13,959.0	13,856.0	103.0	13,362.0	13,278.0	84.0	597.0	578.0	19.0	2,930.0	2,862.0	68.0
Summary	68,008.0	61,853.0	6,155.0	63,503.0	57,800.0	5,703.0	54,954.0	51,787.0	3,167.0	50,788.0	48,316.0	2,472.0	4,166.0	3,471.0	695.0	8,549.0	6,013.0	2,536.0
Total	198,489.9	183,748.0	14,741.9	186,129.7	173,154.9	12,974.8	165,363.6	158,004.1	7,359.5	157,192.6	151,016.2	6,176.4	8,171.0	6,987.9	1,183.1	20,766.1	15,150.8	5,615.3
Pacific Southwest:																		
California	51,990.0	47,337.0	4,653.0	49,668.0	45,975.0	3,693.0	46,593.0	43,947.0	2,646.0	43,451.0	42,174.0	1,277.0	3,142.0	1,773.0	1,369.0	3,075.0	2,028.0	1,047.0
Hawaii	245.0	5.0	240.0	202.0	4.0	198.0	169.0	4.0	165.0	164.0	4.0	160.0	5.0	.0	5.0	33.0	.0	33.0
Total	52,235.0	47,342.0	4,893.0	49,870.0	45,979.0	3,891.0	46,762.0	43,951.0	2,811.0	43,615.0	42,178.0	1,437.0	3,147.0	1,773.0	1,374.0	3,108.0	2,028.0	1,080.0
Total, Pacific Coast	250,724.9	231,090.0	19,634.9	235,999.7	219,133.9	16,865.8	212,125.6	201,955.1	10,170.5	200,807.6	193,194.2	7,613.4	11,318.0	8,760.9	2,557.1	23,874.1	17,178.8	6,695.3
Northern Rocky Mtn.:																		
Idaho	34,725.7	34,419.9	305.8	31,883.7	31,661.6	222.1	26,642.7	26,540.4	102.3	24,343.5	24,261.9	81.6	2,299.2	2,278.5	20.7	5,241.0	5,121.2	119.8
Montana	31,936.5	31,599.8	336.7	27,977.1	27,690.5	286.6	19,240.7	19,027.9	212.8	17,417.4	17,250.9	166.5	1,823.3	1,777.0	46.3	8,736.4	8,662.6	73.8
South Dakota (West)	1,705.6	1,670.5	35.1	1,643.0	1,626.7	16.3	1,255.0	1,251.6	3.4	1,120.3	1,117.5	2.8	134.7	134.1	.6	388.0	375.1	12.9
Wyoming	8,170.6	7,846.8	323.8	7,194.7	6,962.9	231.8	5,304.7	5,241.8	62.9	4,824.9	4,776.9	48.0	479.8	464.9	14.9	1,890.0	1,721.1	168.9
Total	76,538.4	75,537.0	1,001.4	68,698.5	67,941.7	756.8	52,443.1	52,061.7	381.4	47,706.1	47,407.2	298.9	4,737.0	4,654.5	82.5	16,255.4	15,880.0	375.4
Southern Rocky Mtn.:																		
Arizona	5,389.8	5,039.1	350.7	4,982.2	4,762.6	219.6	4,480.5	4,354.6	125.9	3,948.3	3,838.6	109.7	532.2	516.0	16.2	501.7	408.0	93.7
Colorado	17,989.9	14,521.1	3,468.8	15,035.9	12,623.5	2,412.4	9,924.0	9,082.7	841.3	8,932.8	8,291.1	641.7	991.2	791.6	199.6	5,111.9	3,540.8	1,571.1
Nevada	291.8	267.3	24.5	262.3	249.3	13.0	244.5	238.7	5.8	227.1	222.7	4.4	17.4	16.0	1.4	17.8	10.6	7.2
New Mexico	7,177.6	6,330.0	847.6	6,395.2	5,796.0	599.2	5,213.0	4,944.4	268.6	4,606.5	4,391.4	215.1	606.5	553.0	53.5	1,182.2	851.6	330.6
Utah	5,018.0	3,778.1	1,239.9	4,439.9	3,561.7	878.2	3,000.2	2,724.8	275.4	2,657.6	2,446.2	211.4	342.6	278.6	64.0	1,439.7	836.9	602.8
Total	35,867.1	29,935.6	5,931.5	31,115.5	26,993.1	4,122.4	22,862.2	21,345.2	1,517.0	20,372.3	19,190.0	1,182.3	2,489.9	2,155.2	334.7	8,253.3	5,647.9	2,605.4
Total, Rocky Mtn.	112,405.5	105,472.6	6,932.9	99,814.0	94,934.8	4,879.2	75,305.3	73,406.9	1,898.4	68,078.4	66,597.2	1,481.2	7,226.9	6,809.7	417.2	24,508.7	21,527.9	2,980.8
Total, all regions	792,370.6	484,632.7	307,737.8	710,967.8	455,779.1	255,188.8	504,828.0	367,821.1	137,006.9	452,785.7	341,903.7	110,882.0	52,042.3	25,917.4	26,124.9	206,139.9	87,958.0	118,181.9

Table 3.8—*Net volume of timber on commercial timberland in the United States, by class of timber, softwoods and hardwoods, section, region, and State, January 1, 1977—Cont'd.*

[Million cubic feet]

Section, region and State	Rough trees			Rotten trees			Salvable dead trees		
	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hard wood
New England:									
Connecticut	133.7	36.9	96.8	53.2	2.5	50.7	.0	.0	.0
Maine	1,462.9	845.9	617.0	1,477.0	636.4	840.6	.0	.0	.0
Massachusetts	484.2	147.5	336.7	101.9	9.8	92.1	.0	.0	.0
New Hampshire	593.4	238.7	354.7	359.0	62.5	296.5	.0	.0	.0
Rhode Island	60.2	8.6	51.6	8.2	.3	7.9	.0	.0	.0
Vermont	880.3	302.7	577.6	357.5	29.3	328.2	.0	.0	.0
Total	3,614.7	1,580.3	2,034.4	2,356.8	740.8	1,616.0	.0	.0	.0
Middle Atlantic:									
Delaware	29.8	2.1	27.7	7.9	.2	7.7	.0	.0	.0
Maryland	285.0	20.7	264.3	111.7	3.5	108.2	.0	.0	.0
New Jersey	105.8	15.6	90.2	31.3	4.6	26.7	.0	.0	.0
New York	1,615.0	476.9	1,138.1	1,155.1	91.7	1,063.4	.0	.0	.0
Pennsylvania	2,037.9	192.6	1,845.3	770.0	22.9	747.1	.0	.0	.0
West Virginia	1,516.3	83.5	1,432.8	639.9	14.4	625.5	.0	.0	.0
Total	5,589.8	791.4	4,798.4	2,715.9	137.3	2,578.6	.0	.0	.0
Lake States:									
Michigan	1,182.2	142.4	1,039.8	308.6	39.9	268.7	73.5	25.4	48.1
Minnesota	1,044.3	170.8	873.5	347.5	35.1	312.4	107.1	47.9	59.2
North Dakota	59.3	.0	59.3	39.7	.0	39.7	.0	.0	.0
South Dakota (East)	12.9	.6	12.3	26.4	.4	26.0	.0	.0	.0
Wisconsin	986.9	81.5	905.4	313.6	33.3	280.3	65.8	18.0	47.8
Total	3,285.6	395.3	2,890.3	1,035.8	108.7	927.1	246.4	91.3	155.1
Central:									
Illinois	47.9	.1	47.8	7.7	.0	7.7	7.5	.0	7.5
Indiana	331.9	4.6	327.3	74.6	.1	74.5	23.7	.6	23.1
Iowa	276.3	4.2	272.1	27.0	.0	27.0	.5	.0	.5
Kansas	370.4	1.5	368.9	23.7	.0	23.7	5.4	.0	5.4
Kentucky	777.4	102.5	674.9	446.6	4.1	442.5	.0	.0	.0
Missouri	2,544.0	31.7	2,512.3	456.5	4.6	451.9	141.5	10.8	130.7
Nebraska	90.6	10.0	80.6	26.5	1.6	24.9	4.9	.3	4.6
Ohio	404.6	8.6	396.0	292.6	1.9	290.7	.0	.0	.0
Total	4,843.1	163.2	4,679.9	1,355.2	12.3	1,342.9	183.5	11.7	171.8
Total, North	17,333.2	2,930.2	14,403.0	7,463.7	999.1	6,464.6	429.9	103.0	326.9
South Atlantic:									
North Carolina	2,331.6	156.6	2,175.0	692.3	39.8	652.5	37.1	32.7	4.4
South Carolina	1,967.0	219.1	1,747.9	544.6	35.0	509.6	26.7	18.0	8.7
Virginia	3,031.0	181.0	2,850.0	457.8	6.5	451.3	46.8	30.6	16.2
Total	7,329.6	556.7	6,772.9	1,694.7	81.3	1,613.4	110.6	81.3	29.3
East Gulf									
Florida	1,433.9	144.2	1,289.7	327.7	57.3	270.4	16.5	11.7	4.8
Georgia	2,177.9	224.5	1,953.4	734.3	31.3	703.0	45.3	29.8	15.5
Total	3,611.8	368.7	3,243.1	1,062.0	88.6	973.4	61.8	41.5	20.3
Central Gulf:									
Alabama	1,677.0	151.4	1,525.6	772.3	128.4	643.9	15.0	10.2	4.8
Mississippi	1,775.9	198.0	1,577.9	528.5	27.0	501.5	14.1	8.9	5.2
Tennessee	1,324.2	47.1	1,277.1	720.8	26.3	694.5	32.9	16.3	16.6
Total	4,777.1	396.5	4,380.6	2,021.6	181.7	1,839.9	62.0	35.4	26.6
West Gulf:									
Arkansas	1,827.1	58.6	1,768.5	970.5	27.3	943.2	33.3	13.1	20.2
Louisiana	1,795.5	134.5	1,661.0	785.4	121.2	664.2	.8	.8	.0
Oklahoma	610.1	15.0	595.1	111.0	3.1	107.9	1.5	.0	1.5
Texas	1,519.7	105.4	1,414.3	376.6	14.5	362.1	96.6	2.3	94.3
Total	5,752.4	313.5	5,438.9	2,243.5	166.1	2,077.4	132.2	16.2	116.0
Total, South	21,470.9	1,635.4	19,835.5	7,021.8	517.7	6,504.1	366.6	174.4	192.2
Pacific Northwest:									
Alaska:									
Coastal	31.6	30.8	.8	1,680.9	1,669.9	11.0	766.8	766.1	.7
Interior	23.8	9.0	14.8	84.4	12.1	72.3	45.7	38.2	7.5
Summary	55.4	39.8	15.6	1,765.3	1,682.0	83.3	812.5	804.3	8.2
Oregon:									
Western	1,056.0	199.0	857.0	1,917.0	1,605.0	312.0	1,249.0	1,233.0	16.0
Eastern	307.0	286.0	21.0	415.0	413.0	2.0	278.0	278.0	.0
Summary	1,363.0	485.0	878.0	2,332.0	2,018.0	314.0	1,527.0	1,511.0	16.0
Washington:									
Western	610.0	316.0	294.0	725.0	704.0	21.0	2,387.0	2,321.0	66.0
Eastern	146.0	78.0	68.0	178.0	176.0	2.0	459.0	458.0	1.0
Summary	756.0	394.0	362.0	903.0	880.0	23.0	2,846.0	2,779.0	67.0
Total	2,174.4	918.8	1,255.6	5,000.3	4,580.0	420.3	5,185.5	5,094.3	91.2
Pacific Southwest:									
California	830.0	190.0	640.0	1,064.0	752.0	312.0	428.0	420.0	8.0
Hawaii	19.0	.0	19.0	13.0	1.0	12.0	11.0	.0	11.0
Total	849.0	190.0	659.0	1,077.0	753.0	324.0	439.0	420.0	19.0
Total, Pacific Coast	3,023.4	1,108.8	1,914.6	6,077.3	5,333.0	744.3	5,624.5	5,514.3	110.2
Northern Rocky Mtn.:									
Idaho	320.7	273.9	46.8	561.4	537.7	23.7	1,959.9	1,946.7	13.2
Montana	494.9	470.8	24.1	344.5	328.9	15.6	3,120.0	3,109.6	10.4
South Dakota (West)	29.1	14.2	14.9	6.3	2.4	3.9	27.2	27.2	.0
Wyoming	259.0	230.5	28.5	163.1	123.2	39.9	553.8	530.2	23.6
Total	1,103.7	989.4	114.3	1,075.3	992.2	83.1	5,660.9	5,613.7	47.2
Southern Rocky Mtn.:									
Arizona	206.0	135.3	70.7	74.2	18.3	55.9	127.4	122.9	4.5
Colorado	425.9	297.5	128.4	1,102.5	309.9	792.6	1,425.6	1,290.2	135.4
Nevada	7.2	5.2	2.0	11.7	3.7	8.0	10.6	9.1	1.5
New Mexico	333.1	237.1	96.0	145.7	37.4	108.3	303.6	259.5	44.1
Utah	138.3	56.9	81.4	275.2	49.2	226.0	164.6	110.3	54.3
Total	1,110.5	732.0	378.5	1,609.3	418.5	1,190.8	2,031.8	1,792.0	239.8
Total, Rocky Mtn.	2,214.2	1,721.4	492.8	2,684.6	1,410.7	1,273.9	7,692.7	7,405.7	287.0
Total, all regions	44,041.7	7,395.8	36,645.9	23,247.4	8,260.5	14,986.9	14,113.7	13,197.4	916.3

Table 3.9—*Net volume of softwood growing stock on commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977*

[Million cubic feet]

Section, region and State	All ownerships 1977	All ownerships 1970	All ownerships 1962	All ownerships 1952	National Forest 1977	National Forest 1970	National Forest 1962	National Forest 1952	Other public 1977	Other public 1970	Other public 1962	Other public 1952	Forest industry 1977	Forest industry 1970	Forest industry 1962	Forest industry 1952	Farmer and other private 1977	Farmer and other private 1970	Farmer and other private 1962	Farmer and other private 1952
New England:																				
Connecticut	425.0	339.1	213.4	158.0	.0	.0	.0	.0	50.2	34.8	21.8	16.2	.0	.0	.0	.0	374.8	304.3	191.6	141.8
Maine	16,060.3	14,763.2	12,562.2	10,092.3	21.9	20.1	18.0	14.6	265.4	244.0	135.6	112.1	9,120.4	8,383.8	5,221.7	4,193.6	6,652.6	6,115.3	7,186.9	5,772.0
Massachusetts	1,438.7	1,198.8	972.3	631.0	.0	.0	.0	.0	262.9	148.3	120.1	78.0	24.0	98.7	80.1	52.0	1,151.8	951.8	772.1	501.0
New Hampshire	3,525.8	2,901.7	2,534.5	2,207.6	276.3	332.5	290.4	252.9	58.7	80.9	70.7	61.6	799.8	487.9	426.1	371.2	2,391.0	2,000.4	1,747.3	1,521.9
Rhode Island	107.9	70.4	22.3	15.0	.0	.0	.0	.0	4.3	5.3	1.7	1.1	.0	.0	.0	.0	103.6	65.1	20.6	13.9
Vermont	1,825.6	1,661.9	1,379.1	1,250.2	39.0	46.8	38.3	34.7	91.6	50.4	41.9	37.9	212.1	244.6	203.0	184.1	1,482.9	1,320.1	1,095.9	993.5
Total	23,383.3	20,935.1	17,683.8	14,354.1	337.2	399.4	346.7	302.2	733.1	563.7	391.8	306.9	10,156.3	9,215.0	5,930.9	4,800.9	12,156.7	10,757.0	11,014.4	8,944.1
Middle Atlantic:																				
Delaware	168.5	229.0	229.9	236.3	.0	.0	.0	.0	8.8	4.8	4.8	5.0	28.3	15.1	16.6	14.2	131.4	209.1	208.5	217.1
Maryland	793.0	785.8	774.6	716.7	.0	.0	.0	.0	81.9	30.8	30.6	28.4	91.2	70.1	68.7	63.5	619.9	684.9	675.3	624.8
New Jersey	251.4	259.2	281.4	249.5	.0	.0	.0	.0	57.9	26.7	29.0	25.8	.0	.5	.5	.5	193.5	232.0	251.9	223.2
New York	3,523.1	3,291.3	3,036.5	2,748.6	.0	.0	.0	.0	441.5	412.5	380.5	344.4	382.0	356.9	329.3	298.0	2,699.6	2,521.9	2,326.7	2,106.2
Pennsylvania	1,778.1	1,600.3	1,435.6	1,229.5	60.0	49.8	44.7	38.3	213.1	191.8	172.0	147.3	71.1	63.9	57.3	49.1	1,433.9	1,294.8	1,161.6	994.8
West Virginia	1,091.8	776.0	588.0	492.4	239.0	186.5	141.2	118.3	17.7	43.9	33.3	27.8	96.3	30.2	22.9	19.1	738.8	515.4	390.6	327.2
Total	7,605.9	6,941.6	6,346.0	5,673.0	299.0	236.3	185.9	156.6	820.9	710.5	650.2	578.7	668.9	536.7	495.3	444.4	5,817.1	5,458.1	5,014.6	4,493.3
Lake States:																				
Michigan	5,060.7	4,250.6	3,623.6	2,369.3	816.4	685.2	587.0	270.5	1,191.1	1,000.8	851.5	533.6	897.3	753.3	641.4	563.1	2,155.9	1,811.3	1,543.7	1,002.1
Minnesota	3,477.0	3,416.0	3,383.5	2,698.0	871.1	899.0	905.4	780.0	1,564.5	1,564.0	1,564.5	1,115.0	265.0	273.0	283.8	232.0	776.4	680.0	629.8	571.0
North Dakota	.1	.3	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.3	.2	.0
South Dakota (East)	22.8	18.2	15.4	13.7	.0	.0	.0	.0	21.1	17.2	14.2	11.3	.0	.0	.0	.0	1.7	1.0	1.2	2.4
Wisconsin	3,340.1	2,661.1	2,111.4	1,550.0	475.4	378.9	299.8	136.4	784.4	624.8	496.2	485.2	589.5	469.8	373.7	110.0	1,490.8	1,187.6	941.7	818.4
Total	11,900.7	10,346.2	9,134.1	6,631.0	2,162.9	1,963.1	1,792.2	1,186.9	3,561.1	3,206.8	2,926.4	2,145.1	1,751.8	1,496.1	1,298.9	905.1	4,424.9	3,680.2	3,116.6	2,393.9
Central:																				
Illinois	23.8	19.5	16.2	16.6	16.3	14.1	11.1	5.0	.6	.0	.4	.1	2.1	1.1	1.4	.7	4.8	4.3	3.3	10.8
Indiana	87.0	68.4	52.3	27.0	13.5	10.1	8.1	3.2	20.2	16.1	12.1	14.0	.6	.0	.4	.2	52.7	42.2	31.7	9.6
Iowa	6.2	5.5	4.6	3.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	6.2	5.5	4.6	3.6
Kansas	.6	.5	.3	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.6	.5	.3	.2
Kentucky	916.0	749.3	566.4	492.5	153.1	211.6	160.0	139.1	3.5	95.1	71.9	62.5	6.4	15.3	11.5	10.1	753.0	427.3	323.0	280.8
Missouri	392.2	357.3	316.1	264.0	177.2	161.4	163.1	134.1	11.9	10.9	7.0	5.0	20.7	18.9	9.0	7.1	182.4	166.1	137.0	117.8
Nebraska	119.0	114.1	103.2	72.9	29.5	28.3	26.3	19.0	5.9	5.0	4.2	3.8	.0	.0	.0	.0	83.6	80.8	72.7	50.1
Ohio	139.4	123.8	108.8	94.5	9.7	8.7	7.6	6.6	13.0	11.5	10.1	8.8	5.3	4.7	4.1	3.6	111.4	98.9	87.0	75.5
Total	1,684.2	1,438.4	1,167.9	971.3	399.3	434.2	376.2	307.0	55.1	138.6	105.7	94.2	35.1	40.0	26.4	21.7	1,194.7	825.6	659.6	548.4
Total, North	44,574.1	39,661.3	34,331.8	27,629.4	3,198.4	3,033.0	2,701.0	1,952.7	5,170.2	4,619.6	4,074.1	3,124.9	12,612.1	11,287.8	7,751.5	6,172.1	23,593.4	20,720.9	19,805.2	16,379.7
South Atlantic:																				
North Carolina	10,741.7	9,846.2	8,980.1	8,478.9	461.7	393.9	332.3	313.7	376.6	344.6	323.3	254.4	1,078.1	1,181.5	1,248.2	1,441.4	8,825.3	7,926.2	7,076.3	6,469.4
South Carolina	7,079.2	6,369.3	5,324.3	4,800.5	722.1	649.7	567.0	581.8	362.7	326.3	238.1	112.2	1,450.0	1,304.6	1,017.1	700.1	4,544.4	4,088.7	3,502.1	3,406.4
Virginia	5,512.1	5,083.6	4,905.4	5,127.2	290.4	229.3	213.1	223.2	275.3	233.3	205.2	214.6	877.1	839.5	744.3	777.7	4,069.3	3,781.5	3,742.8	3,911.7
Total	23,333.0	21,299.1	19,209.8	18,406.6	1,474.2	1,272.9	1,112.4	1,118.7	1,014.6	904.2	766.6	581.2	3,405.2	3,325.6	3,009.6	2,919.2	17,439.0	15,796.4	14,321.2	13,787.5
East Gulf:																				
Florida	7,524.7	6,904.2	5,870.2	5,108.6	822.5	754.7	616.8	521.1	555.9	510.1	379.2	295.9	2,419.2	2,219.7	1,860.5	1,602.3	3,727.1	3,419.7	3,013.7	2,689.3
Georgia	16,880.3	14,122.1	11,858.3	10,308.9	554.3	466.0	403.2	350.5	811.2	677.9	723.4	628.8	2,978.2	2,485.5	2,241.2	1,948.4	12,536.6	10,492.7	8,490.5	7,381.2
Total	24,405.0	21,026.3	17,728.5	15,417.5	1,376.8	1,220.7	1,020.0	871.6	1,367.1	1,188.0	1,102.6	924.7	5,397.4	4,705.2	[illegible]	3,550.7	16,263.7	13,912.4	11,504.2	10,070.5
Central Gulf:																				
Alabama	12,339.3	10,737.0	8,684.0	5,875.8	549.6	516.0	417.0	278.3	229.8	207.0	167.0	98.3	3,247.3	2,972.0	2,404.0	1,634.3	8,312.6	7,042.0	5,696.0	3,864.9
Mississippi	8,929.1	7,188.9	5,259.3	3,673.7	1,252.7	1,074.3	1,089.0	578.8	375.8	373.1	221.1	341.9	1,725.5	1,373.4	1,450.3	1,419.0	5,575.1	4,368.1	2,498.9	1,334.0
Tennessee	2,287.0	1,799.8	1,479.4	1,226.7	331.7	261.0	293.1	219.7	251.3	197.8	101.5	101.6	217.0	170.8	96.9	79.2	1,487.0	1,170.2	987.9	826.2
Total	23,555.4	19,725.7	15,422.7	10,776.2	2,134.0	1,851.3	1,799.1	1,076.8	856.9	777.9	489.6	541.8	5,189.8	4,516.2	3,951.2	3,132.5	15,374.7	12,580.3	9,182.8	6,025.1

Table 3.9—*Net volume of softwood growing stock on commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977—Cont'd.*

[Million cubic feet]

Section, region and State	All ownerships 1977	All ownerships 1970	All ownerships 1962	All ownerships 1952	National Forest 1977	National Forest 1970	National Forest 1962	National Forest 1952	Other public 1977	Other public 1970	Other public 1962	Other public 1952	Forest industry 1977	Forest industry 1970	Forest industry 1962	Forest industry 1952	Farmer and other private 1977	Farmer and other private 1970	Farmer and other private 1962	Farmer and other private 1952
West Gulf:																				
Arkansas	7,059.7	6,539.0	5,810.3	4,640.4	1,325.3	1,227.6	1,148.5	885.5	97.9	90.7	54.1	40.8	2,898.9	2,685.0	3,275.4	2,383.6	2,737.6	2,535.7	1,332.3	1,330.5
Louisiana	9,417.1	8,182.0	6,628.0	4,253.4	729.3	620.0	511.0	267.5	207.4	111.0	120.0	82.9	2,733.1	2,607.0	3,253.0	2,145.0	5,747.3	4,844.0	2,744.0	1,758.0
Oklahoma	1,010.4	858.0	692.4	539.3	127.0	103.0	117.6	73.1	50.2	26.0	2.2	2.2	517.2	506.0	456.0	359.2	316.0	223.0	116.6	104.8
Texas	8,355.7	7,266.0	6,061.2	4,211.9	1,058.4	938.0	1,156.9	679.7	143.6	124.0	85.6	49.1	3,217.5	3,209.0	2,662.0	1,901.0	3,936.2	2,995.0	2,156.7	1,582.1
Total	25,842.9	22,845.0	19,191.9	13,645.0	3,240.0	2,888.6	2,934.0	1,905.8	499.1	351.7	261.9	175.0	9,366.7	9,007.0	9,646.4	6,788.8	12,737.1	10,597.7	6,349.6	4,775.4
Total, South	97,136.3	84,896.1	71,552.9	58,245.3	8,225.0	7,233.5	6,865.5	4,972.9	3,737.7	3,221.8	2,620.7	2,222.7	23,359.1	21,554.0	20,708.9	16,391.2	61,814.5	52,886.8	41,357.8	34,658.5
Pacific Northwest:																				
Alaska:																				
Coastal	38,188.9	40,373.0	41,038.9	41,599.4	35,414.3	37,555.1	38,228.4	38,849.5	2,311.3	2,651.0	2,641.4	2,580.4	1.1	1.1	1.1	.0	462.2	165.8	168.0	169.5
Interior	2,431.0	2,431.0	2,431.0	2,431.0	.0	.0	.0	.0	2,310.9	2,310.9	2,310.9	2,310.9	.0	.0	.0	.0	120.1	120.1	120.1	120.1
Summary	40,619.9	42,804.0	43,469.9	44,030.4	35,414.3	37,555.1	38,228.4	38,849.5	4,622.2	4,961.9	4,952.3	4,891.3	1.1	1.1	1.1	.0	582.3	285.9	288.1	289.6
Oregon:																				
Western	52,603.0	56,823.0	60,155.0	64,302.0	28,670.0	29,674.0	30,728.0	30,047.0	10,779.0	11,295.0	11,652.0	12,283.0	9,602.0	10,304.0	12,695.0	16,386.0	3,552.0	5,550.0	5,080.0	5,586.0
Eastern	22,132.0	23,536.0	23,272.0	23,278.0	16,234.0	17,677.0	17,372.0	15,441.0	1,930.0	1,607.0	1,583.0	2,989.0	2,508.0	2,667.0	2,769.0	2,674.0	1,460.0	1,585.0	1,548.0	2,174.0
Summary	74,735.0	80,359.0	83,427.0	87,580.0	44,904.0	47,351.0	48,100.0	45,488.0	12,709.0	12,902.0	13,235.0	15,272.0	12,110.0	12,971.0	15,464.0	19,060.0	5,012.0	7,135.0	6,628.0	7,760.0
Washington:																				
Western	41,082.0	42,336.0	44,255.0	45,602.0	15,418.0	15,804.0	16,976.0	17,537.0	8,382.0	8,315.0	8,135.0	7,802.0	12,376.0	13,463.0	14,704.0	16,339.0	4,906.0	4,754.0	4,440.0	3,924.0
Eastern	16,718.0	17,621.0	17,312.0	16,392.0	7,415.0	8,234.0	8,385.0	7,967.0	4,818.0	4,876.0	4,953.0	4,803.0	1,341.0	1,371.0	1,203.0	1,301.0	3,144.0	3,140.0	2,771.0	2,321.0
Summary	57,800.0	59,957.0	61,567.0	61,994.0	22,833.0	24,038.0	25,361.0	25,504.0	13,200.0	13,191.0	13,088.0	12,605.0	13,717.0	14,834.0	15,907.0	17,640.0	8,050.0	7,894.0	7,211.0	6,245.0
Total	173,154.9	183,120.0	188,463.9	193,604.4	103,151.3	108,944.1	111,689.4	109,841.5	30,531.2	31,054.9	31,275.3	32,768.3	25,828.1	27,806.1	31,372.1	36,700.0	13,644.3	15,314.9	14,127.1	14,294.6
Pacific Southwest:																				
California	45,975.0	47,696.0	53,365.0	58,006.0	28,073.0	28,694.0	29,391.0	29,590.0	1,108.0	1,150.0	1,435.0	1,892.0	7,457.0	8,244.0	9,639.0	11,268.0	9,337.0	9,608.0	12,900.0	15,256.0
Hawaii	4.0	4.0	4.0	3.8	.0	.0	.0	.0	3.0	3.0	3.0	2.6	.0	.0	.0	.0	1.0	1.0	1.0	1.2
Total	45,979.0	47,700.0	53,369.0	58,009.8	28,073.0	28,694.0	29,391.0	29,590.0	1,111.0	1,153.0	1,438.0	1,894.6	7,457.0	8,244.0	9,639.0	11,268.0	9,338.0	9,609.0	12,901.0	15,257.2
Total, Pacific Coast	219,133.9	230,820.0	241,832.9	251,614.2	131,224.3	137,638.1	141,080.4	139,431.5	31,642.2	32,207.9	32,713.3	34,662.9	33,285.1	36,050.1	41,011.1	47,968.0	22,982.3	24,923.9	27,028.1	29,551.8
Northern Rocky Mtn.:																				
Idaho	31,661.6	31,330.6	30,241.6	28,676.8	21,589.0	20,899.5	20,212.2	18,893.8	3,267.3	3,267.3	3,091.9	2,991.8	2,912.6	3,271.1	3,345.5	3,438.2	3,892.7	3,892.7	3,592.0	3,353.0
Montana	27,690.5	28,780.8	29,792.3	27,366.6	18,089.5	18,775.3	19,612.0	17,443.5	2,543.4	2,543.4	2,493.5	2,334.8	2,097.0	2,501.5	2,864.0	3,104.0	4,960.6	4,960.6	4,822.8	4,484.3
South Dakota (West)	1,626.7	1,468.4	1,353.9	1,222.0	1,344.9	1,221.0	1,139.9	1,045.6	78.8	55.4	47.9	39.5	18.8	11.8	10.2	8.4	184.2	180.2	155.9	128.5
Wyoming	6,962.9	6,295.4	5,543.3	5,260.2	5,568.7	4,901.2	4,233.6	4,074.7	576.4	576.4	541.5	490.1	60.7	60.7	57.0	51.6	757.1	757.1	711.2	643.8
Total	67,941.7	67,875.2	66,931.1	62,525.6	46,592.1	45,797.0	45,197.7	41,457.6	6,465.9	6,442.5	6,174.8	5,856.2	5,089.1	5,845.1	6,276.7	6,602.2	9,794.6	9,790.6	9,281.9	8,609.6
Southern Rocky Mtn.:																				
Arizona	4,762.6	4,583.8	4,688.8	4,600.7	3,207.7	3,028.9	3,077.1	2,888.0	1,449.3	1,449.3	1,502.2	1,596.4	.0	.0	.0	.0	105.6	105.6	109.5	116.3
Colorado	12,623.5	12,292.1	11,774.0	10,925.1	9,485.7	9,154.3	8,823.0	8,204.5	712.8	712.8	670.4	618.1	21.4	21.4	20.1	18.6	2,403.6	2,403.6	2,260.5	2,083.9
Nevada	249.3	237.4	244.1	234.9	85.9	74.0	86.2	79.4	9.0	9.0	8.7	8.6	15.5	15.5	15.0	14.8	138.9	138.9	134.2	132.1
New Mexico	5,796.0	5,735.2	5,739.4	5,513.7	2,871.6	2,810.8	2,836.0	2,577.7	1,346.8	1,346.8	1,337.1	1,352.2	.0	112.9	112.1	113.3	1,577.6	1,464.7	1,454.2	1,470.5
Utah	3,561.7	3,689.1	3,726.7	3,656.8	2,807.8	2,935.2	2,937.0	2,784.9	411.7	411.7	431.3	476.2	.0	.0	.0	.0	342.2	342.2	358.4	395.7
Total	26,993.1	26,537.6	26,173.0	24,931.2	18,458.7	18,003.2	17,759.3	16,534.5	3,929.6	3,929.6	3,949.7	4,051.5	36.9	149.8	147.2	146.7	4,567.9	4,455.0	4,316.8	4,198.5
Total, Rocky Mtn	94,934.8	94,412.8	93,104.1	87,456.8	65,050.8	63,800.2	62,957.0	57,992.1	10,395.5	10,372.1	10,124.5	9,907.7	5,126.0	5,994.9	6,423.9	6,748.9	14,362.5	14,245.6	13,598.7	12,808.1
Total, all regions	455,779.1	449,790.2	440,821.7	424,945.7	207,698.5	211,704.8	213,603.9	204,349.2	50,945.6	50,421.4	49,532.6	49,918.2	74,382.3	74,886.8	75,895.4	77,280.2	122,752.7	112,777.2	101,789.8	93,398.1

Table 3.10—*Net volume of hardwood growing stock on commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977*

[Million cubic feet]

Section, region	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
and State	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952
New England:																				
Connecticut	2,237.4	1,893.7	1,547.6	1,146.0	.0	.0	.0	.0	190.2	200.1	163.6	121.1	.0	2.6	2.2	1.6	2,047.2	1,691.0	1,381.8	1,023.3
Maine	6,543.4	6,490.2	6,047.6	5,378.3	46.1	45.7	21.3	18.1	87.3	86.7	59.6	50.8	3,311.1	3,284.1	2,489.7	2,215.3	3,098.9	3,073.7	3,477.0	3,094.1
Massachusetts	2,454.3	2,008.1	1,566.8	1,240.0	.0	.0	.0	.0	326.4	266.1	207.6	164.3	43.2	154.8	120.8	95.6	2,084.7	1,587.2	1,238.4	980.1
New Hampshire	3,760.4	3,207.2	2,659.3	1,756.7	623.0	882.4	731.7	483.3	128.2	69.1	57.4	37.9	629.0	439.2	364.1	240.6	2,380.2	1,816.5	1,506.1	994.9
Rhode Island	304.1	255.3	217.4	146.0	.0	.0	.0	.0	16.6	19.0	16.2	10.9	.0	.0	.0	.0	287.5	236.3	201.2	135.1
Vermont	3,164.7	2,915.4	2,318.5	2,227.9	155.4	196.5	157.8	151.6	157.3	143.0	113.5	109.1	533.2	503.5	400.6	385.0	2,318.8	2,072.4	1,646.6	1,582.2
Total	18,464.3	16,769.9	14,357.2	11,894.9	824.5	1,124.6	910.8	653.0	906.0	784.0	617.9	494.1	4,516.5	4,384.2	3,377.4	2,938.1	12,217.3	10,477.1	9,451.1	7,809.7
Middle Atlantic:																				
Delaware	456.2	428.0	318.4	219.9	.0	.0	.0	.0	17.5	8.6	6.4	4.4	9.8	29.1	23.1	13.3	428.9	390.3	288.9	202.2
Maryland	2,699.1	2,564.3	2,358.4	2,053.2	.0	.0	.0	.0	260.2	177.7	163.0	141.9	97.2	65.7	60.8	52.9	2,341.7	2,320.9	2,134.6	1,858.4
New Jersey	1,282.1	1,192.3	1,112.1	916.1	.0	.0	.0	.0	181.8	60.9	56.7	46.7	28.4	2.5	2.2	1.9	1,071.9	1,128.9	1,053.2	867.5
New York	9,732.5	9,226.0	8,604.3	7,775.1	.0	.0	.0	.0	647.2	613.5	572.1	517.0	902.3	855.4	797.7	720.9	8,183.0	7,757.1	7,234.5	6,537.2
Pennsylvania	21,624.7	18,670.4	15,602.4	11,716.7	1,183.6	707.7	591.4	444.1	4,175.0	3,604.6	3,012.3	2,262.1	945.1	816.0	681.9	512.1	15,321.0	13,542.1	11,316.8	8,498.4
West Virginia	13,060.9	11,420.6	10,479.9	8,621.9	1,741.0	1,174.2	1,077.5	886.4	290.9	446.1	409.4	336.8	1,137.5	664.9	610.1	502.0	9,891.5	9,135.4	8,382.9	6,896.7
Total	48,855.5	43,501.6	38,475.5	31,302.9	2,924.6	1,881.9	1,668.9	1,330.5	5,572.6	4,911.4	4,219.9	3,308.9	3,120.3	2,433.6	2,175.8	1,803.1	37,238.0	34,274.7	30,410.9	24,860.4
Lake States:																				
Michigan	14,153.5	12,184.9	10,667.8	7,609.7	1,374.9	1,183.3	1,034.8	578.1	2,881.2	2,480.0	2,176.2	1,418.8	1,853.9	1,596.3	1,397.5	1,174.7	8,043.5	6,925.3	6,059.3	4,438.1
Minnesota	7,977.0	7,210.0	6,060.2	4,253.0	1,000.0	961.0	808.0	570.0	2,898.5	2,606.0	2,319.8	1,434.0	371.0	362.0	295.3	213.0	3,707.5	3,281.0	2,637.1	2,036.0
North Dakota	257.3	246.4	248.6	257.8	.0	.0	.0	.0	79.3	75.9	77.2	79.4	.0	.0	.0	.0	178.0	170.5	171.4	178.4
South Dakota (East)	110.9	86.7	71.4	73.0	.0	.0	.0	.0	20.7	15.9	13.4	12.1	.0	.0	.0	.0	90.2	70.8	58.0	60.9
Wisconsin	10,117.3	9,076.5	7,731.1	6,411.8	881.9	790.6	672.6	564.2	1,912.9	1,716.3	1,461.2	1,192.6	973.3	872.7	742.2	423.2	6,349.2	5,696.9	4,855.1	4,231.8
Total	32,616.0	28,804.5	24,779.1	18,605.3	3,256.8	2,934.9	2,515.4	1,712.3	7,792.6	6,894.1	6,047.8	4,136.9	3,198.2	2,831.0	2,435.0	1,810.9	18,368.4	16,144.5	13,780.9	10,945.2
Central:																				
Illinois	2,156.0	2,210.1	2,328.0	2,386.5	101.2	103.9	109.3	69.0	40.7	41.4	44.0	35.7	6.0	5.8	6.5	15.0	2,008.1	2,059.0	2,168.2	2,266.8
Indiana	3,671.0	3,468.9	3,365.6	2,876.0	156.1	147.2	144.7	50.0	250.2	236.5	228.9	185.8	21.5	19.6	20.2	20.9	3,243.2	3,065.6	2,971.8	2,619.3
Iowa	1,031.9	1,130.3	1,329.0	1,356.8	.0	.0	2.7	1.1	118.3	94.1	53.1	18.7	11.8	9.1	4.3	5.1	901.8	1,027.1	1,268.9	1,331.9
Kansas	583.8	523.9	482.8	476.9	.0	.0	.0	.0	24.3	21.6	20.3	16.0	.0	.0	.0	.0	559.5	502.3	462.5	460.9
Kentucky	11,051.6	9,738.1	8,357.8	5,859.0	626.5	522.4	448.3	314.2	350.9	301.0	258.4	181.1	241.1	284.7	244.3	171.3	9,833.1	8,630.0	7,406.8	5,192.4
Missouri	5,629.7	5,600.4	5,488.4	5,449.9	664.9	661.4	631.7	577.7	152.7	151.8	96.0	109.0	145.6	145.0	99.9	109.0	4,666.5	4,642.2	4,660.8	4,654.2
Nebraska	322.7	343.8	345.8	284.3	.0	.0	.0	.0	7.5	7.9	7.7	6.6	.0	.0	.0	.0	315.2	335.9	338.1	277.7
Ohio	4,188.3	4,109.1	3,760.9	3,152.8	95.6	93.8	85.9	72.0	248.1	243.4	222.8	186.8	115.5	113.3	103.7	86.9	3,729.1	3,658.6	3,348.5	2,807.1
Total	28,635.0	27,124.6	25,458.3	21,842.2	1,644.3	1,528.7	1,422.6	1,084.0	1,192.7	1,097.7	931.2	739.7	541.5	577.5	478.9	408.2	25,256.5	23,920.7	22,625.6	19,610.3
Total, North	128,570.8	116,200.6	103,070.1	83,645.3	8,650.2	7,470.1	6,517.7	4,779.8	15,463.9	13,687.2	11,816.8	8,679.6	11,376.5	10,226.3	8,467.1	6,960.3	93,080.2	84,817.0	76,268.5	63,225.6
South Atlantic:																				
North Carolina	15,389.0	13,393.8	11,758.1	10,712.7	1,270.8	1,125.1	1,011.2	814.2	331.6	294.7	270.4	171.4	1,218.8	1,218.8	1,211.1	1,531.9	12,567.8	10,755.2	9,265.4	8,195.2
South Carolina	7,121.4	6,330.2	5,652.8	5,411.0	309.5	275.1	236.3	195.0	217.6	193.5	151.8	75.8	1,478.0	1,313.8	1,062.5	650.5	5,116.3	4,547.8	4,202.2	4,489.7
Virginia	14,144.4	12,346.2	10,965.8	9,789.8	1,512.2	1,153.9	881.4	786.9	545.6	432.4	230.1	205.7	933.6	930.5	886.0	790.6	11,153.0	9,829.4	8,968.3	8,006.6
Total	36,654.8	32,070.2	28,376.7	25,913.5	3,092.5	2,554.1	2,128.9	1,796.1	1,094.8	920.6	652.3	452.9	3,630.4	3,463.1	3,159.6	2,973.0	28,837.1	25,132.4	22,435.9	20,691.5
East Gulf:																				
Florida	4,208.0	3,984.2	3,706.9	3,517.4	180.8	171.2	129.2	102.7	135.6	128.4	100.0	75.9	1,375.8	1,302.6	1,120.2	1,053.4	2,515.8	2,382.0	2,357.5	2,285.4
Georgia	11,521.4	10,164.9	8,770.7	8,190.8	756.1	670.9	622.7	581.6	323.0	284.6	254.4	237.5	1,819.3	1,606.1	1,201.6	1,122.1	8,623.0	7,603.3	6,692.0	6,249.6
Total	15,729.4	14,149.1	12,477.6	11,708.2	936.9	842.1	751.9	684.3	458.6	413.0	354.4	313.4	3,195.1	2,908.7	2,321.8	2,175.5	11,138.8	9,985.3	9,049.5	8,535.0
Central Gulf:																				
Alabama	9,900.5	8,701.0	7,781.0	6,476.9	251.9	244.0	218.0	146.6	179.1	159.0	142.0	82.9	1,777.5	1,376.0	1,230.0	887.0	7,692.0	6,922.0	6,191.0	5,360.4
Mississippi	8,304.6	6,689.1	6,281.6	6,370.8	501.9	342.2	394.6	143.7	365.5	335.7	187.9	199.0	1,278.9	943.9	970.7	648.1	6,158.3	5,067.3	4,728.4	5,380.0
Tennessee	10,216.9	8,596.0	7,819.1	7,023.5	565.2	475.5	387.6	275.9	626.1	526.8	402.8	377.8	871.8	733.5	563.1	436.9	8,153.8	6,860.2	6,465.6	5,932.9
Total	28,422.0	23,986.1	21,881.7	19,871.2	1,319.0	1,061.7	1,000.2	566.2	1,170.7	1,021.5	732.7	659.7	3,928.2	3,053.4	2,763.8	1,972.0	22,004.1	18,849.5	17,385.0	16,673.3

Table 3.10—*Net volume of hardwood growing stock on commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977—Cont'd.*

[Million cubic feet]

Section, region and State	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952
West Gulf:																				
Arkansas	10,085.5	8,826.7	9,256.3	9,468.0	1,230.5	1,076.9	997.4	656.3	507.5	444.1	562.8	359.9	2,182.7	1,910.2	2,197.9	1,366.0	6,164.8	5,395.5	5,498.2	7,085.8
Louisiana	8,013.8	7,806.0	8,312.0	6,756.6	219.6	139.0	147.0	89.2	314.1	180.0	142.0	114.3	1,889.3	1,556.0	1,542.0	1,183.4	5,590.8	5,931.0	6,481.0	5,369.7
Oklahoma	1,051.1	992.0	827.4	839.9	74.7	26.0	55.2	42.9	96.9	88.0	30.9	30.7	211.1	169.0	130.4	128.7	668.4	709.0	610.9	637.6
Texas	4,916.4	4,093.0	3,353.6	3,680.9	149.4	144.0	145.0	115.5	93.2	71.0	23.4	18.9	1,398.1	1,147.0	1,001.8	969.8	3,275.7	2,731.0	2,183.4	2,576.7
Total	24,066.8	21,717.7	21,749.3	20,745.4	1,674.2	1,385.9	1,344.6	903.9	1,011.7	783.1	759.1	523.8	5,681.2	4,782.2	4,872.1	3,647.9	15,699.7	14,766.5	14,773.5	15,669.8
Total, South	104,873.0	91,923.1	84,485.3	78,238.3	7,022.6	5,843.8	5,225.6	3,950.5	3,735.8	3,138.2	2,498.5	1,949.8	16,434.9	14,207.4	13,117.3	10,768.4	77,679.7	68,733.7	63,643.9	61,569.6
Pacific Northwest:																				
Alaska:																				
Coastal	384.6	393.7	395.2	395.0	236.8	246.0	247.6	247.5	147.4	147.3	147.2	147.1	.0	.0	.0	.0	.4	.4	.4	.4
Interior	2,068.2	2,068.2	2,068.2	2,068.2	.0	.0	.0	.0	1,966.0	1,966.0	1,966.0	1,966.0	.0	.0	.0	.0	102.2	102.2	102.2	102.2
Summary	2,452.8	2,461.9	2,463.4	2,463.2	236.8	246.0	247.6	247.5	2,113.4	2,113.3	2,113.2	2,113.1	.0	.0	.0	.0	102.6	102.6	102.6	102.6
Oregon:																				
Western	4,794.0	5,994.0	5,119.0	4,192.0	888.0	925.0	859.0	714.0	1,197.0	1,098.0	829.0	627.0	1,301.0	1,410.0	1,210.0	939.0	1,408.0	2,561.0	2,221.0	1,912.0
Eastern	25.0	27.0	27.0	25.0	9.0	11.0	11.0	9.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	14.0	14.0	14.0	14.0
Summary	4,819.0	6,021.0	5,146.0	4,217.0	897.0	936.0	870.0	723.0	1,198.0	1,099.0	830.0	628.0	1,302.0	1,411.0	1,211.0	940.0	1,422.0	2,575.0	2,235.0	1,926.0
Washington:																				
Western	5,532.0	4,987.0	3,944.0	2,716.0	111.0	128.0	113.0	90.0	1,066.0	932.0	697.0	453.0	2,035.0	1,854.0	1,453.0	950.0	2,320.0	2,073.0	1,681.0	1,223.0
Eastern	171.0	171.0	157.0	143.0	30.0	33.0	33.0	31.0	58.0	58.0	57.0	54.0	18.0	17.0	11.0	10.0	65.0	63.0	56.0	48.0
Summary	5,703.0	5,158.0	4,101.0	2,859.0	141.0	161.0	146.0	121.0	1,124.0	990.0	754.0	507.0	2,053.0	1,871.0	1,464.0	960.0	2,385.0	2,136.0	1,737.0	1,271.0
Total	12,974.8	13,640.9	11,710.4	9,539.2	1,274.8	1,343.0	1,263.6	1,091.5	4,435.4	4,202.3	3,697.2	3,248.1	3,355.0	3,282.0	2,675.0	1,900.0	3,909.6	4,813.6	4,074.6	3,299.6
Pacific Southwest:																				
California	3,693.0	3,797.0	2,975.0	2,828.0	1,133.0	1,255.0	1,286.0	1,276.0	283.0	263.0	190.0	218.0	679.0	717.0	449.0	336.0	1,598.0	1,562.0	1,050.0	998.0
Hawaii	198.0	198.0	219.0	219.3	.0	.0	.0	.0	95.0	95.0	99.0	98.7	.0	.0	.0	.0	103.0	103.0	120.0	120.6
Total	3,891.0	3,995.0	3,194.0	3,047.3	1,133.0	1,255.0	1,286.0	1,276.0	378.0	358.0	289.0	316.7	679.0	717.0	449.0	336.0	1,701.0	1,665.0	1,170.0	1,118.6
Total, Pacific Coast	16,865.8	17,635.9	14,904.4	12,586.5	2,407.8	2,598.0	2,549.6	2,367.5	4,813.4	4,560.3	3,986.2	3,564.8	4,034.0	3,999.0	3,124.0	2,236.0	5,610.6	6,478.6	5,244.6	4,418.2
Northern Rocky Mtn.																				
Idaho	222.1	237.1	234.4	212.3	66.9	76.4	85.8	76.7	48.7	48.7	45.6	41.7	27.7	33.2	34.4	34.6	78.8	78.8	68.6	59.3
Montana	286.6	275.0	267.4	247.7	46.0	33.2	32.8	27.8	61.7	61.7	59.4	55.2	6.1	7.3	8.3	8.9	172.8	172.8	166.9	155.8
South Dakota (West)	16.3	10.8	7.8	5.7	8.9	4.6	3.0	2.3	.9	1.0	.7	.5	.7	.3	.2	.2	5.8	4.9	3.9	2.7
Wyoming	231.8	224.7	207.3	187.2	81.1	74.0	67.0	61.2	57.8	57.8	53.8	48.4	3.4	3.4	3.2	2.9	89.5	89.5	83.3	74.7
Total	756.8	747.6	716.9	652.9	202.9	188.2	188.6	168.0	169.1	169.2	159.5	145.8	37.9	44.2	46.1	46.6	346.9	346.0	322.7	292.5
Southern Rocky Mtn.:																				
Arizona	219.6	226.1	206.4	173.6	132.7	139.2	126.3	102.5	47.8	47.8	44.1	39.1	.0	.0	.0	.0	39.1	39.1	36.0	32.0
Colorado	2,412.4	2,251.1	2,030.6	1,786.8	1,637.5	1,476.2	1,315.0	1,147.3	149.9	149.9	138.5	123.7	.4	.4	.3	.3	624.6	624.6	576.8	515.5
Nevada	13.0	12.8	14.1	12.0	13.0	12.8	14.1	12.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
New Mexico	599.2	600.9	544.4	456.4	240.4	242.1	222.0	177.9	31.8	31.8	28.6	24.7	.0	17.0	15.3	13.2	327.0	310.0	278.5	240.6
Utah	878.2	1,038.7	989.2	896.7	444.1	604.6	592.2	545.5	145.3	145.3	132.9	117.6	.0	.0	.0	.0	288.8	288.8	264.1	233.6
Total	4,122.4	4,129.6	3,784.7	3,325.5	2,467.7	2,474.9	2,269.6	1,985.2	374.8	374.8	344.1	305.1	.4	17.4	15.6	13.5	1,279.5	1,262.5	1,155.4	1,021.7
Total, Rocky Mtn	4,879.2	4,877.2	4,501.6	3,978.4	2,670.6	2,663.1	2,458.2	2,153.2	543.9	544.0	503.6	450.9	38.3	61.6	61.7	60.1	1,626.4	1,608.5	1,478.1	1,314.2
Total, all regions	255,188.8	230,636.8	206,961.4	178,448.5	20,751.2	18,575.0	16,751.1	13,251.0	24,557.0	21,929.7	18,805.1	14,645.1	31,883.7	28,494.3	24,770.1	20,024.8	177,996.9	161,637.8	146,635.1	130,527.6

Table 3.11—*Net volume of softwood sawtimber on commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977*

[Million board feet, International 1/4-inch log rule]

Section, region and State	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952
New England:																				
Connecticut	1,305.4	1,023.0	355.0	263.0	.0	.0	.0	.0	135.7	91.4	31.8	23.5	.0	.0	.0	.0	1,169.7	931.6	323.2	239.5
Maine	25,231.7	23,455.9	20,144.0	17,233.0	43.1	40.1	38.8	36.3	301.1	279.9	234.1	228.5	13,569.7	12,614.6	8,474.8	7,236.8	11,317.8	10,521.3	11,396.3	9,731.4
Massachusetts	4,167.7	3,304.0	2,534.0	1,299.0	.0	.0	.0	.0	779.3	322.3	247.2	126.7	84.5	279.6	214.3	109.9	3,303.9	2,702.1	2,072.5	1,062.4
New Hampshire	8,606.7	6,861.6	5,977.0	5,381.0	579.7	749.9	653.2	588.1	158.1	194.4	169.3	152.4	1,317.5	1,166.3	1,015.9	914.6	6,551.4	4,751.0	4,138.6	3,725.9
Rhode Island	288.7	180.0	43.0	29.0	.0	.0	.0	.0	6.3	12.9	3.2	2.1	.0	.0	.0	.0	282.4	167.1	39.8	26.9
Vermont	4,199.4	3,621.0	2,775.0	3,270.0	64.6	99.2	75.8	89.3	225.1	139.3	107.5	126.7	487.8	521.0	398.8	470.0	3,421.9	2,861.5	2,192.9	2,584.0
Total	43,799.6	38,445.5	31,828.0	27,475.0	687.4	889.2	767.8	713.7	1,605.6	1,040.2	793.1	659.9	15,459.5	14,581.5	10,103.8	8,731.3	26,047.1	21,934.6	20,163.3	17,370.1
Middle Atlantic:																				
Delaware	408.1	459.8	491.0	539.0	.0	.0	.0	.0	21.3	5.9	6.3	6.9	76.7	34.7	40.3	36.9	310.1	419.2	444.4	495.2
Maryland	1,726.4	1,680.0	1,630.0	1,472.0	.0	.0	.0	.0	121.2	64.4	62.8	56.7	223.7	139.8	135.2	122.1	1,381.5	1,475.8	1,432.0	1,293.2
New Jersey	574.6	574.0	557.0	406.0	.0	.0	.0	.0	147.2	51.7	50.1	36.5	.0	1.1	1.1	.8	427.4	521.2	505.8	368.7
New York	7,770.7	7,273.5	6,769.0	6,310.0	.0	.0	.0	.0	659.9	617.7	574.9	535.9	855.3	800.5	745.0	694.5	6,255.5	5,855.3	5,449.1	5,079.6
Pennsylvania	3,713.5	3,433.9	3,223.0	2,988.0	134.9	133.4	125.3	116.1	554.5	512.8	481.3	446.2	144.3	133.4	125.2	116.1	2,879.8	2,654.3	2,491.2	2,309.6
West Virginia	2,901.1	1,927.0	1,460.0	1,394.0	819.3	533.7	404.3	386.1	53.3	140.1	106.1	101.3	306.7	70.0	53.0	50.7	1,721.8	1,183.2	896.6	855.9
Total	17,094.4	15,348.2	14,130.0	13,109.0	954.2	667.1	529.6	502.2	1,557.4	1,392.6	1,281.5	1,183.5	1,606.7	1,179.5	1,099.8	1,021.1	12,976.1	12,109.0	11,219.1	10,402.2
Lake States:																				
Michigan	13,204.9	10,846.0	9,119.5	5,929.0	1,467.6	1,205.1	1,012.3	428.3	3,200.2	2,628.6	2,206.9	1,334.5	3,007.5	2,470.3	2,079.2	1,836.4	5,529.6	4,542.0	3,821.1	2,329.8
Minnesota	8,530.6	7,247.0	6,133.0	4,713.0	2,550.5	1,763.0	1,233.0	1,006.0	3,355.1	3,236.0	2,976.0	2,030.0	596.8	568.0	531.0	480.0	2,028.2	1,680.0	1,393.0	1,197.0
North Dakota	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0
South Dakota (East)	66.1	52.0	46.2	42.0	.0	.0	.0	.0	60.0	47.4	41.9	39.0	.0	.0	.0	.0	6.1	4.6	4.3	3.0
Wisconsin	9,182.7	7,033.0	5,463.2	4,495.0	1,092.0	836.4	650.1	346.2	1,973.7	1,511.3	1,174.6	1,609.3	1,982.4	1,518.3	1,180.1	301.2	4,134.6	3,167.0	2,458.4	2,238.3
Total	30,984.3	25,178.1	20,761.9	15,179.0	5,110.1	3,804.5	2,895.4	1,780.5	8,589.0	7,423.3	6,399.4	5,012.8	5,586.7	4,556.6	3,790.3	2,617.6	11,698.5	9,393.7	7,676.8	5,768.1
Central:																				
Illinois	29.6	24.0	28.0	31.1	6.1	5.0	5.8	1.5	.2	.0	.2	.1	8.4	7.0	7.9	2.3	14.9	12.0	14.1	27.2
Indiana	254.7	193.0	139.4	78.0	14.0	10.6	7.7	1.5	73.9	56.2	40.4	47.3	1.2	.0	.7	.4	165.6	126.2	90.6	28.8
Iowa	13.8	10.7	7.3	6.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0	13.8	10.7	7.3	5.9
Kansas	.6	.0	.1	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.6	.0	.1	.2
Kentucky	2,091.3	1,710.0	1,310.0	1,607.0	437.6	436.4	334.3	410.1	8.0	17.6	13.4	16.5	14.9	50.8	39.0	47.8	1,630.8	1,205.2	923.3	1,132.6
Missouri	1,292.3	1,120.0	924.0	685.0	696.8	603.9	568.3	347.3	41.2	35.7	17.1	12.3	34.5	29.9	23.8	19.2	519.8	450.5	314.8	306.2
Nebraska	509.9	470.0	406.0	260.0	116.3	106.9	82.9	64.2	25.1	23.1	18.9	13.9	.0	.0	.0	.0	368.5	340.0	304.2	181.9
Ohio	433.0	377.5	342.0	326.0	27.4	23.9	21.6	20.6	41.7	36.4	32.9	31.4	22.5	19.7	17.8	17.0	341.4	297.5	269.7	257.0
Total	4,625.2	3,905.2	3,156.8	2,993.3	1,298.2	1,186.7	1,020.6	845.2	190.1	169.0	122.9	121.6	81.5	107.4	89.2	86.7	3,055.4	2,442.1	1,924.1	1,939.8
Total, North	96,503.5	82,877.0	69,876.7	58,756.3	8,049.9	6,547.5	5,213.4	3,841.6	11,942.1	10,025.1	8,596.9	6,977.8	22,734.4	20,425.0	15,083.1	12,456.7	53,777.1	45,879.4	40,983.3	35,480.2
South Atlantic:																				
North Carolina	35,374.6	31,860.3	28,846.7	26,819.1	1,734.6	1,401.9	1,096.2	992.3	1,200.8	1,083.2	1,009.6	804.6	3,331.4	3,950.7	4,471.2	4,559.2	29,107.8	25,424.5	22,269.7	20,463.0
South Carolina	22,808.6	20,381.6	16,811.0	15,449.0	2,685.4	2,399.7	2,023.3	1,455.2	1,159.5	1,036.1	724.1	479.6	4,460.4	3,985.8	3,124.5	2,782.5	14,503.3	12,960.0	10,939.1	10,731.7
Virginia	16,134.1	14,731.8	13,886.3	13,739.0	1,023.7	830.1	816.7	808.1	824.8	688.3	672.4	664.7	2,589.6	2,584.4	2,402.0	2,376.7	11,696.0	10,629.0	9,995.2	9,889.5
Total	74,317.3	66,973.7	59,544.0	56,007.1	5,443.7	4,631.7	3,936.2	3,255.6	3,185.1	2,807.6	2,406.1	1,948.9	10,381.4	10,520.9	9,997.7	9,718.4	55,307.1	49,013.5	43,204.0	41,084.2
East Gulf:																				
Florida	21,129.0	19,966.1	16,789.0	14,707.0	2,280.1	2,154.6	1,670.0	1,447.1	1,793.1	1,694.4	1,223.3	936.8	6,646.1	6,280.3	5,288.1	4,610.2	10,409.7	9,836.8	8,607.6	7,712.9
Georgia	52,949.1	43,600.7	36,411.1	32,596.5	2,244.5	1,831.2	1,529.3	1,369.1	3,146.1	2,616.1	2,840.0	2,542.5	8,884.6	7,324.9	6,881.7	6,160.7	38,673.9	31,828.5	25,160.1	22,524.2
Total	74,078.1	63,566.8	53,200.1	47,303.5	4,524.6	3,985.8	3,199.3	2,816.2	4,939.2	4,310.5	4,063.3	3,479.3	15,530.7	13,605.2	12,169.8	10,770.9	49,083.6	41,665.3	33,767.7	30,237.1
Central Gulf:																				
Alabama	46,508.8	40,062.0	32,556.0	21,273.0	2,437.8	2,198.0	1,786.0	1,101.0	933.1	724.0	589.0	301.0	13,158.0	11,902.0	9,672.0	6,275.0	29,979.9	25,238.0	20,509.0	13,596.0
Mississippi	35,370.0	28,079.2	20,008.0	13,832.0	6,363.4	5,133.8	5,030.0	2,899.0	1,739.4	1,474.6	760.0	1,180.0	6,392.2	5,959.5	5,254.0	6,413.0	20,875.0	15,511.3	8,964.0	3,340.0
Tennessee	6,024.4	4,699.1	3,996.0	3,412.4	1,107.2	863.6	929.0	814.4	796.9	621.6	285.8	309.8	572.2	446.3	275.5	257.8	3,548.1	2,767.6	2,505.7	2,030.4
Total	87,903.2	72,840.3	56,560.0	38,517.4	9,908.4	8,195.4	7,745.0	4,814.4	3,469.4	2,820.2	1,634.8	1,790.8	20,122.4	18,307.8	15,201.5	12,945.8	54,403.0	43,516.9	31,978.7	18,966.4

Table 3.11—*Net volume of softwood sawtimber on commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section, region and State	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952
West Gulf:																				
Arkansas	26,461.5	25,251.6	22,022.0	17,408.0	4,587.9	4,378.2	4,051.0	3,346.0	392.0	374.1	195.0	158.0	12,246.6	11,686.5	13,638.0	11,676.0	9,235.0	8,812.8	4,138.0	2,228.0
Louisiana	38,647.8	33,707.0	27,634.0	19,560.0	3,584.5	2,678.0	2,239.0	1,292.0	995.7	457.0	442.0	325.0	11,687.5	11,459.0	12,730.0	10,048.0	22,380.1	19,113.0	12,223.0	7,895.0
Oklahoma	3,575.8	2,990.0	2,295.0	1,771.0	510.2	412.0	503.0	307.0	145.4	109.0	8.0	7.0	1,923.5	1,839.0	1,463.0	1,241.0	996.7	630.0	321.0	216.0
Texas	36,038.8	30,475.0	24,457.0	15,989.0	5,420.4	4,643.0	5,390.0	2,759.0	756.8	518.0	272.0	149.0	14,497.6	14,684.0	11,578.0	8,071.0	15,364.0	10,630.0	7,217.0	5,010.0
Total	104,723.9	92,423.6	76,408.0	54,728.0	14,103.0	12,111.2	12,183.0	7,704.0	2,289.9	1,458.1	917.0	639.0	40,355.2	39,668.5	39,409.0	31,036.0	47,975.8	39,185.8	23,899.0	15,349.0
Total, South	341,022.5	295,804.4	245,712.1	196,556.0	33,979.7	28,924.1	27,063.5	18,590.2	13,883.6	11,396.4	9,021.2	7,858.0	86,389.7	82,102.4	76,778.0	64,471.1	206,769.5	173,381.5	132,849.4	105,636.7
Pacific Northwest:																				
Alaska:																				
Coastal	174,604.0	184,688.0	187,967.0	190,794.0	161,918.3	171,796.7	175,094.3	178,181.5	10,567.7	12,127.4	12,098.3	11,834.8	4.9	5.2	5.1	.0	2,113.1	758.7	769.3	777.7
Interior	9,801.8	9,801.8	9,801.8	9,801.8	.0	.0	.0	.0	9,317.6	9,317.6	9,317.6	9,317.6	.0	.0	.0	.0	484.2	484.2	484.2	484.2
Summary	184,405.8	194,489.8	197,768.8	200,595.8	161,918.3	171,796.7	175,094.3	178,181.5	19,885.3	21,445.0	21,415.9	21,152.4	4.9	5.2	5.1	.0	2,597.3	1,242.9	1,253.5	1,261.9
Oregon:																				
Western	310,664.0	338,662.0	368,199.0	405,339.0	174,480.0	176,182.0	184,657.0	182,823.0	63,290.0	68,129.0	71,945.0	77,197.0	54,468.0	64,907.0	83,740.0	112,848.0	18,426.0	29,444.0	27,857.0	32,471.0
Eastern	103,522.0	113,222.0	116,887.0	125,262.0	78,324.0	87,567.0	89,993.0	84,374.0	9,317.0	7,708.0	7,781.0	15,176.0	10,562.0	11,798.0	12,940.0	15,233.0	5,319.0	6,149.0	6,173.0	10,479.0
Summary	414,186.0	451,884.0	485,086.0	530,601.0	252,804.0	263,749.0	274,650.0	267,197.0	72,607.0	75,837.0	79,726.0	92,373.0	65,030.0	76,705.0	96,680.0	128,081.0	23,745.0	35,593.0	34,030.0	42,950.0
Washington:																				
Western	235,390.0	243,903.0	261,586.0	278,388.0	96,282.0	97,427.0	105,653.0	110,383.0	45,132.0	45,614.0	46,525.0	46,756.0	70,234.0	77,937.0	87,765.0	101,384.0	23,742.0	22,925.0	21,643.0	19,865.0
Eastern	77,910.0	82,231.0	83,640.0	82,698.0	37,537.0	41,717.0	43,698.0	42,564.0	22,583.0	22,881.0	23,861.0	23,799.0	5,740.0	5,966.0	5,678.0	6,800.0	12,050.0	11,667.0	10,403.0	9,535.0
Summary	313,300.0	326,134.0	345,226.0	361,086.0	133,819.0	139,144.0	149,351.0	152,947.0	67,715.0	68,495.0	70,386.0	70,555.0	75,974.0	83,903.0	93,443.0	108,184.0	35,792.0	34,592.0	32,046.0	29,400.0
Total	911,891.8	972,507.8	1,028,080.8	1,092,282.8	548,541.3	574,689.7	599,095.3	598,325.5	160,207.3	165,777.0	171,527.9	184,080.4	141,008.9	160,613.2	190,128.1	236,265.0	62,134.3	71,427.9	67,329.5	73,611.9
Pacific Southwest																				
California	255,594.0	267,081.0	299,247.0	337,797.0	157,958.0	163,227.0	171,879.0	176,982.0	6,356.0	6,464.0	7,955.0	10,952.0	40,883.0	44,920.0	51,532.0	63,406.0	50,397.0	52,470.0	67,881.0	86,457.0
Hawaii	17.0	17.0	16.0	16.3	.0	.0	.0	.0	11.0	11.0	11.0	10.8	.0	.0	.0	.0	6.0	6.0	5.0	5.5
Total	255,611.0	267,098.0	299,263.0	337,813.3	157,958.0	163,227.0	171,879.0	176,982.0	6,367.0	6,475.0	7,966.0	10,962.8	40,883.0	44,920.0	51,532.0	63,406.0	50,403.0	52,476.0	67,886.0	86,462.5
Total, Pacific Coast	1,167,502.8	1,239,605.8	1,327,343.8	1,430,096.1	706,499.3	737,916.7	770,974.3	775,307.5	166,574.3	172,252.0	179,493.9	195,043.2	181,891.9	205,533.2	241,660.1	299,671.0	112,537.3	123,903.9	135,215.5	160,074.4
Northern Rocky Mtn.																				
Idaho	139,049.7	139,835.9	139,793.2	137,701.5	95,429.7	94,580.0	93,731.0	89,475.0	14,425.2	14,425.2	14,471.9	15,060.2	13,290.4	14,926.3	16,089.7	17,664.3	15,904.4	15,904.4	15,500.6	15,502.0
Montana	96,238.0	102,763.2	110,221.8	105,497.6	60,061.0	64,748.6	69,792.0	64,182.0	9,219.0	9,219.0	9,378.6	9,141.5	9,526.4	11,364.0	13,484.2	15,172.8	17,431.6	17,431.6	17,567.0	17,001.3
South Dakota (West)	5,597.0	5,380.0	5,284.0	5,045.0	4,690.7	4,570.0	4,539.0	4,381.0	269.8	194.7	179.1	159.6	62.8	38.4	35.3	31.5	573.7	576.9	530.6	472.9
Wyoming	26,682.6	23,715.0	20,489.0	19,948.0	21,967.6	19,000.0	16,032.0	15,891.0	1,951.7	1,951.7	1,844.9	1,679.3	220.0	220.0	208.0	189.3	2,543.3	2,543.3	2,404.1	2,188.4
Total	267,567.3	271,694.1	275,788.0	268,192.1	182,149.0	182,898.6	184,094.0	173,929.0	25,865.7	25,790.6	25,874.5	26,040.6	23,099.6	26,548.7	29,817.2	33,057.9	36,453.0	36,456.2	36,002.3	35,164.6
Southern Rocky Mtn.																				
Arizona	22,063.0	20,902.7	22,218.0	22,714.0	14,977.0	13,816.7	14,707.0	14,494.0	6,727.2	6,727.2	7,130.7	7,803.8	.0	.0	.0	.0	358.8	358.8	380.3	416.2
Colorado	50,684.0	50,606.0	49,965.0	47,598.0	39,485.0	39,407.0	39,329.0	37,598.0	2,567.7	2,567.7	2,438.6	2,292.8	74.5	74.5	70.7	66.5	8,556.8	8,556.8	8,126.7	7,640.7
Nevada	1,363.1	1,319.5	1,362.0	1,327.0	417.1	373.5	441.0	411.0	51.1	51.1	49.8	49.5	86.3	86.3	84.1	83.6	808.6	808.6	787.1	782.9
New Mexico	24,345.6	24,054.6	25,168.0	25,422.0	12,472.6	12,181.6	12,847.0	12,254.0	5,876.5	5,876.5	6,098.1	6,517.4	.0	430.3	446.6	477.3	5,996.5	5,566.2	5,776.3	6,173.3
Utah	14,356.5	14,809.1	15,324.0	15,542.0	11,257.5	11,710.1	11,904.0	11,520.0	1,685.9	1,685.9	1,860.5	2,188.0	.0	.0	.0	.0	1,413.1	1,413.1	1,559.5	1,834.0
Total	112,812.2	111,691.9	114,037.0	112,603.0	78,609.2	77,488.9	79,228.0	76,277.0	16,908.4	16,908.4	17,577.7	18,851.5	160.8	591.1	601.4	627.4	17,133.8	16,703.5	16,629.9	16,847.1
Total, Rocky Mtn	380,379.5	383,386.0	389,825.0	380,795.1	260,758.2	260,387.5	263,322.0	250,206.0	42,774.1	42,699.0	43,452.2	44,892.1	23,260.4	27,139.8	30,418.6	33,685.3	53,586.8	53,159.7	52,632.2	52,011.7
Total, all regions	1,985,408.1	2,001,673.0	2,032,757.5	2,066,203.4	1,009,287.1	1,033,775.8	1,066,573.2	1,047,945.3	235,174.1	236,372.5	240,564.2	254,771.1	314,276.4	335,200.4	363,939.8	410,284.1	426,670.7	396,324.5	361,680.4	353,203.0

Table 3.12—*Net volume of hardwood sawtimber on commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977*

[Million board feet, International 1/4-inch log rule]

Section, region	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
and State	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952	1977	1970	1962	1952
New England:																				
Connecticut	4,564.2	3,555.0	2,961.0	1,596.0	.0	.0	.0	.0	358.5	301.6	251.1	135.4	.0	6.9	5.6	3.1	4,205.7	3,246.5	2,704.3	1,457.5
Maine	10,886.2	11,063.8	10,556.0	9,807.0	102.9	104.6	41.2	41.7	102.6	104.3	97.0	98.1	6,347.1	6,450.6	4,420.8	4,102.3	4,333.6	4,404.3	5,997.0	5,564.9
Massachusetts	3,700.1	2,633.0	1,892.0	1,360.0	.0	.0	.0	.0	425.4	236.8	170.0	122.3	29.9	224.3	161.2	115.9	3,244.8	2,171.9	1,560.8	1,121.8
New Hampshire	5,957.0	5,587.0	4,652.0	3,075.0	1,321.6	2,042.8	1,700.8	1,124.3	206.8	108.6	90.6	59.8	1,061.1	674.1	561.3	371.0	3,367.5	2,761.5	2,299.3	1,519.9
Rhode Island	407.9	344.0	308.0	136.0	.0	.0	.0	.0	27.2	44.4	39.7	17.5	.0	.0	.0	.0	380.7	299.6	268.3	118.5
Vermont	6,191.8	5,528.0	4,124.0	4,626.0	354.9	560.6	421.8	473.2	335.2	262.9	196.2	220.0	1,169.6	1,015.5	760.1	852.6	4,332.1	3,689.0	2,745.9	3,080.2
Total	31,707.2	28,710.8	24,493.0	20,600.0	1,779.4	2,708.0	2,163.8	1,639.2	1,455.7	1,058.6	844.6	653.1	8,607.7	8,371.4	5,909.0	5,444.9	19,864.4	16,572.8	15,575.6	12,862.8
Middle Atlantic:																				
Delaware	984.6	900.9	734.0	573.0	.0	.0	.0	.0	40.7	10.2	8.3	6.5	13.1	68.1	60.0	39.1	930.8	822.6	665.7	527.4
Maryland	6,440.2	5,746.0	5,462.0	5,042.0	.0	.0	.0	.0	576.0	309.5	293.9	271.3	148.4	58.2	55.4	51.2	5,715.8	5,378.3	5,112.7	4,719.5
New Jersey	2,552.4	2,468.0	2,395.0	2,325.0	.0	.0	.0	.0	355.7	69.2	67.1	65.2	45.1	5.2	5.0	4.8	2,151.6	2,393.6	2,322.9	2,255.0
New York	18,317.2	17,706.7	16,971.0	16,096.0	.0	.0	.0	.0	1,258.2	1,216.2	1,165.7	1,105.6	2,063.5	1,994.7	1,911.8	1,813.2	14,995.5	14,495.8	13,893.5	13,177.2
Pennsylvania	30,537.8	26,182.3	21,908.0	16,670.0	2,038.8	1,096.2	917.2	697.9	5,871.0	5,033.6	4,211.9	3,204.8	1,283.8	1,100.7	921.0	700.8	21,344.2	18,951.8	15,857.9	12,066.5
West Virginia	26,032.8	22,828.0	20,888.0	22,716.0	3,584.6	2,058.4	1,883.4	2,048.2	509.4	804.5	736.2	800.6	2,590.5	1,311.7	1,200.3	1,305.3	19,348.3	18,653.4	17,068.1	18,561.9
Total	84,865.0	75,831.9	68,358.0	63,422.0	5,623.4	3,154.6	2,800.6	2,746.1	8,611.0	7,443.2	6,483.1	5,454.0	6,144.4	4,538.6	4,153.5	3,914.4	64,486.2	60,695.5	54,920.8	51,307.5
Lake States:																				
Michigan	29,236.1	25,729.0	23,364.1	16,764.0	2,014.0	1,772.3	1,612.1	865.0	5,909.7	5,200.9	4,719.6	3,070.3	5,040.9	4,435.5	4,018.6	3,369.8	16,271.5	14,320.3	13,013.8	9,458.9
Minnesota	16,076.6	12,088.0	8,742.0	6,272.0	1,740.2	1,050.0	608.0	312.0	5,022.5	3,959.0	2,759.0	1,552.0	661.6	534.0	385.0	288.0	8,652.3	6,545.0	4,990.0	4,120.0
North Dakota	473.5	447.0	456.0	509.2	.0	.0	.0	.0	145.8	137.4	141.2	156.8	.0	.0	.0	.0	327.7	309.6	314.8	352.4
South Dakota (East)	381.7	287.0	230.3	204.0	.0	.0	.0	.0	52.6	39.0	31.8	27.6	.0	.0	.0	.0	329.1	248.0	198.5	176.4
Wisconsin	20,613.9	16,982.0	13,204.6	10,260.0	1,084.3	892.7	686.6	687.4	2,672.2	2,201.0	1,716.6	1,672.4	2,262.9	1,864.3	1,452.5	707.9	14,594.5	12,024.0	9,348.9	7,192.3
Total	66,781.8	55,533.0	45,997.0	34,009.2	4,838.5	3,715.0	2,906.7	1,864.4	13,802.8	11,537.3	9,368.2	6,479.1	7,965.4	6,833.8	5,856.1	4,365.7	40,175.1	33,446.9	27,866.0	21,300.0
Central:																				
Illinois	7,064.4	7,604.0	8,548.4	9,488.9	296.9	319.4	359.3	245.1	125.9	135.4	152.3	133.4	20.2	21.4	24.5	61.4	6,621.4	7,127.8	8,012.3	9,049.0
Indiana	10,712.4	10,595.0	10,665.6	8,754.0	344.1	340.2	341.3	165.0	786.9	777.5	789.3	606.6	63.7	62.5	64.0	64.2	9,517.7	9,414.8	9,471.0	7,918.2
Iowa	3,405.5	3,790.0	4,540.0	5,053.2	.0	.0	9.1	4.0	375.6	303.2	174.0	66.5	38.3	30.0	14.4	19.0	2,991.6	3,456.8	4,342.5	4,963.7
Kansas	2,018.9	1,881.0	1,794.4	1,706.8	.0	.0	.0	.0	91.3	85.1	80.7	62.3	.0	.0	.0	.0	1,927.6	1,795.9	1,713.7	1,644.5
Kentucky	26,850.0	23,536.0	19,897.0	21,311.0	1,569.9	810.6	685.2	734.0	712.6	856.5	724.1	775.5	555.1	818.4	691.8	741.0	24,012.4	21,050.5	17,795.9	19,060.5
Missouri	13,977.3	13,794.0	13,516.0	13,418.0	1,562.5	1,542.2	1,198.9	751.4	406.7	401.4	205.4	214.7	373.3	368.3	187.9	214.7	11,634.8	11,482.1	11,923.8	12,237.2
Nebraska	1,226.9	1,307.0	1,319.0	1,070.7	.0	.0	.0	.0	34.0	35.7	36.6	29.7	.0	.0	.0	.0	1,192.9	1,271.3	1,282.4	1,041.0
Ohio	13,907.7	14,201.8	13,148.0	11,039.0	336.7	343.9	318.4	267.3	864.3	882.6	817.1	686.0	399.2	407.7	377.4	316.9	12,307.5	12,567.6	11,635.1	9,768.8
Total	79,163.1	76,708.8	73,428.4	71,841.6	4,110.1	3,356.3	2,912.2	2,166.8	3,397.3	3,477.4	2,979.5	2,574.7	1,449.8	1,708.3	1,360.0	1,417.2	70,205.9	68,166.8	66,176.7	65,682.9
Total, North	262,517.1	236,784.5	212,276.4	189,872.8	16,351.4	12,933.9	10,783.3	8,416.5	27,266.8	23,516.5	19,675.4	15,160.9	24,167.3	21,452.1	17,278.6	15,142.2	194,731.6	178,882.0	164,539.1	151,153.2
South Atlantic:																				
North Carolina	41,419.2	36,288.3	31,774.1	29,710.4	3,744.6	3,338.5	3,018.5	2,258.0	880.4	870.9	826.1	475.4	3,184.2	3,266.0	3,241.0	4,248.6	33,610.0	28,812.9	24,688.5	22,728.4
South Carolina	18,028.1	16,051.9	14,305.0	14,259.0	764.9	681.1	548.2	409.2	525.2	467.7	371.1	260.9	4,006.1	3,567.0	2,804.2	2,375.0	12,731.9	11,336.1	10,581.5	11,213.9
Virginia	37,636.5	32,187.3	28,234.8	25,439.5	3,954.5	3,098.4	2,087.1	1,880.5	1,598.5	1,151.0	561.9	505.7	2,451.8	2,316.5	2,526.4	2,277.4	29,631.7	25,621.4	23,059.4	20,775.9
Total	97,083.8	84,527.5	74,313.9	69,408.9	8,464.0	7,118.0	5,653.8	4,547.7	3,004.1	2,489.6	1,759.1	1,242.0	9,642.1	9,149.5	8,571.6	8,901.0	75,973.6	65,770.4	58,329.4	54,718.2
East Gulf:																				
Florida	10,820.6	10,498.4	9,541.0	9,207.0	438.0	425.0	308.8	249.5	321.4	311.8	232.5	192.6	3,555.3	3,449.4	3,174.9	3,088.4	6,505.9	6,312.2	5,824.8	5,676.5
Georgia	27,579.7	25,496.1	21,829.2	21,401.5	2,082.8	1,912.2	1,877.3	1,840.5	816.4	764.9	611.2	599.3	4,798.1	4,436.3	3,056.1	2,996.2	19,882.4	18,382.7	16,284.6	15,965.5
Total	38,400.3	35,994.5	31,370.2	30,608.5	2,520.8	2,337.2	2,186.1	2,090.0	1,137.8	1,076.7	843.7	791.9	8,353.4	7,885.7	6,231.0	6,084.6	26,388.3	24,694.9	22,109.4	21,642.0
Central Gulf:																				
Alabama	22,887.2	20,711.0	18,443.0	18,194.0	569.1	583.0	519.0	421.0	454.8	415.0	369.0	247.0	4,389.5	3,381.0	3,011.0	2,735.0	17,473.8	16,332.0	14,544.0	14,791.0
Mississippi	25,271.6	16,652.7	16,081.0	16,854.0	1,654.8	905.6	874.0	314.0	1,276.3	1,006.1	525.0	508.0	4,290.6	2,634.8	1,703.0	1,295.0	18,049.9	12,106.2	12,979.0	14,737.0
Tennessee	26,289.0	21,641.1	19,431.0	18,128.1	1,497.7	1,232.9	1,070.8	784.3	1,876.9	1,545.1	1,075.6	975.0	2,381.3	1,960.3	1,293.3	1,018.8	20,533.1	16,902.8	15,991.3	15,350.0
Total	74,447.8	59,004.8	53,955.0	53,176.1	3,721.6	2,721.5	2,463.8	1,519.3	3,608.0	2,966.2	1,969.6	1,730.0	11,061.4	7,976.1	6,007.3	5,048.8	56,056.8	45,341.0	43,514.3	44,878.0

Table 3.12—*Net volume of hardwood sawtimber on commercial timberland in the United States, by ownership, section, region, and State, 1952, 1962, 1970, and 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section, region and State	All ownerships 1977	All ownerships 1970	All ownerships 1962	All ownerships 1952	National Forest 1977	National Forest 1970	National Forest 1962	National Forest 1952	Other public 1977	Other public 1970	Other public 1962	Other public 1952	Forest industry 1977	Forest industry 1970	Forest industry 1962	Forest industry 1952	Farmer and other private 1977	Farmer and other private 1970	Farmer and other private 1962	Farmer and other private 1952
West Gulf:																				
Arkansas	22,507.0	21,134.3	22,828.0	25,031.0	2,536.6	2,381.9	2,509.0	1,509.0	1,523.4	1,430.5	1,851.0	1,086.0	5,596.2	5,254.9	5,982.0	3,729.0	12,850.8	12,067.0	12,486.0	18,707.0
Louisiana	24,770.5	24,409.0	26,456.0	22,397.0	669.5	377.0	345.0	209.0	1,086.1	545.0	523.0	402.0	6,327.0	5,359.0	4,481.0	3,694.0	16,687.9	18,128.0	21,107.0	18,092.0
Oklahoma	2,490.9	2,361.0	1,844.0	1,988.0	246.0	44.0	97.0	74.0	292.2	199.0	70.0	74.0	486.5	370.0	244.0	261.0	1,466.2	1,748.0	1,433.0	1,579.0
Texas	13,985.7	11,360.0	8,614.0	10,025.0	402.6	422.0	586.0	447.0	235.8	216.0	104.0	85.0	4,024.6	3,444.0	2,424.0	2,512.0	9,322.7	7,278.0	5,500.0	6,981.0
Total	63,754.1	59,264.3	59,742.0	59,441.0	3,854.7	3,224.9	3,537.0	2,239.0	3,137.5	2,390.5	2,548.0	1,647.0	16,434.3	14,427.9	13,131.0	10,196.0	40,327.6	39,221.0	40,526.0	45,359.0
Total, South	273,686.0	238,791.1	219,381.1	212,634.5	18,561.1	15,401.6	13,840.7	10,396.0	10,887.4	8,923.0	7,120.4	5,410.9	45,491.2	39,439.2	33,940.9	30,230.4	198,746.3	175,027.3	164,479.1	166,597.2
Pacific Northwest:																				
Alaska:																				
Coastal	1,355.5	1,387.6	1,393.1	1,392.2	834.7	867.1	872.8	872.2	519.4	519.1	518.9	518.6	.0	.0	.0	.0	1.4	1.4	1.4	1.4
Interior	3,096.2	3,096.2	3,096.2	3,096.2	.0	.0	0	.0	2,943.3	2,943.3	2,943.3	2,943.3	.0	.0	.0	.0	152.9	152.9	152.9	152.9
Summary	4,451.7	4,483.8	4,489.3	4,488.4	834.7	867.1	872.8	872.2	3,462.7	3,462.4	3,462.2	3,461.9	.0	.0	.0	.0	154.3	154.3	154.3	154.3
Oregon:																				
Western	16,916.0	22,975.0	19,564.0	15,733.0	4,714.0	4,898.0	4,461.0	3,593.0	4,022.0	3,577.0	2,670.0	2,000.0	3,909.0	5,612.0	5,023.0	4,093.0	4,271.0	8,888.0	7,410.0	6,047.0
Eastern	70.0	71.0	71.0	68.0	25.0	27.0	27.0	24.0	2.0	2.0	2.0	2.0	.0	.0	.0	.0	43.0	42.0	42.0	42.0
Summary	16,986.0	23,046.0	19,635.0	15,801.0	4,739.0	4,925.0	4,488.0	3,617.0	4,024.0	3,579.0	2,672.0	2,002.0	3,909.0	5,612.0	5,023.0	4,093.0	4,314.0	8,930.0	7,452.0	6,089.0
Washington:																				
Western	16,586.0	14,898.0	11,473.0	7,585.0	568.0	640.0	579.0	443.0	2,899.0	2,545.0	1,873.0	1,110.0	5,711.0	5,106.0	3,743.0	2,289.0	7,408.0	6,607.0	5,278.0	3,743.0
Eastern	410.0	423.0	366.0	356.0	70.0	80.0	84.0	81.0	211.0	216.0	188.0	182.0	42.0	44.0	27.0	30.0	87.0	83.0	67.0	63.0
Summary	16,996.0	15,321.0	11,839.0	7,941.0	638.0	720.0	663.0	524.0	3,110.0	2,761.0	2,061.0	1,292.0	5,753.0	5,150.0	3,770.0	2,319.0	7,495.0	6,690.0	5,345.0	3,806.0
Total	38,433.7	42,850.8	35,963.3	28,230.4	6,211.7	6,512.1	6,023.8	5,013.2	10,596.7	9,802.4	8,195.2	6,755.9	9,662.0	10,762.0	8,793.0	6,412.0	11,963.3	15,774.3	12,951.3	10,049.3
Pacific Southwest:																				
California	8,075.0	7,286.0	5,725.0	5,575.0	2,955.0	2,120.0	2,237.0	2,274.0	572.0	525.0	403.0	474.0	1,206.0	1,355.0	896.0	714.0	3,342.0	3,286.0	2,189.0	2,113.0
Hawaii	1,030.0	1,030.0	722.0	722.0	.0	.0	.0	.0	447.0	447.0	327.0	326.6	.0	.0	.0	0	583.0	583.0	395.0	395.4
Total	9,105.0	8,316.0	6,447.0	6,297.0	2,955.0	2,120.0	2,237.0	2,274.0	1,019.0	972.0	730.0	800.6	1,206.0	1,355.0	896.0	714.0	3,925.0	3,869.0	2,584.0	2,508.4
Total, Pacific Coast	47,538.7	51,166.8	42,410.3	34,527.4	9,166.7	8,632.1	8,260.8	7,287.2	11,615.7	10,774.4	8,925.2	7,556.5	10,868.0	12,117.0	9,689.0	7,126.0	15,888.3	19,643.3	15,535.3	12,557.7
Northern Rocky Mtn.:																				
Idaho	568.1	647.3	737.8	763.3	105.1	165.0	225.0	209.0	164.5	164.5	164.0	159.2	97.1	116.4	139.6	168.4	201.4	201.4	209.2	226.7
Montana	1,095.5	1,096.8	1,077.8	1,017.2	84.5	81.7	84.0	76.0	270.6	270.6	262.9	247.6	20.8	24.9	29.4	32.1	719.6	719.6	701.5	661.5
South Dakota (West)	18.3	14.0	12.0	11.0	7.3	5.0	5.0	5.0	.9	1.4	1.1	.9	.6	.4	.3	.3	9.5	7.2	5.6	4.8
Wyoming	396.6	367.0	320.0	291.0	105.6	76.0	46.0	43.0	110.9	110.9	104.4	94.5	2.7	2.7	2.6	2.3	177.4	177.4	167.0	151.2
Total	2,078.5	2,125.1	2,147.6	2,082.5	302.5	327.7	360.0	333.0	546.9	547.4	532.4	502.2	121.2	144.4	171.9	203.1	1,107.9	1,105.6	1,083.3	1,044.2
Southern Rocky Mtn.:																				
Arizona	647.7	678.7	646.0	572.0	423.7	454.7	434.0	376.0	99.7	99.7	94.3	87.2	.0	.0	.0	.0	124.3	124.3	117.7	108.8
Colorado	4,256.5	4,085.0	3,832.0	3,517.0	3,020.5	2,849.0	2,677.0	2,465.0	280.2	280.2	261.8	238.5	.8	.8	.7	.7	955.0	955.0	892.5	812.8
Nevada	25.2	24.4	27.0	24.0	25.2	24.4	27.0	24.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
New Mexico	1,573.4	1,574.4	1,505.0	1,372.0	463.4	464.4	448.0	385.0	95.1	95.1	90.6	84.6	.0	52.2	49.7	46.4	1,014.9	962.7	916.7	856.0
Utah	1,208.5	1,476.0	1,475.0	1,416.0	784.5	1,052.0	1,054.0	1,000.0	133.1	133.1	132.1	130.5	.0	.0	.0	.0	290.9	290.9	288.9	285.5
Total	7,711.3	7,838.5	7,485.0	6,901.0	4,717.3	4,844.5	4,640.0	4,250.0	608.1	608.1	578.8	540.8	.8	53.0	50.4	47.1	2,385.1	2,332.9	2,215.8	2,063.1
Total, Rocky Mtn.	9,789.8	9,963.6	9,632.6	8,983.5	5,019.8	5,172.2	5,000.0	4,583.0	1,155.0	1,155.5	1,111.2	1,043.0	122.0	197.4	222.3	250.2	3,493.0	3,438.5	3,299.1	3,107.3
Total, all regions	593,531.5	536,705.9	483,700.3	446,018.2	49,099.0	42,139.8	37,884.8	30,682.7	50,924.9	44,369.4	36,832.2	29,171.3	80,648.5	73,205.7	61,130.8	52,748.8	412,859.2	376,991.1	347,852.6	333,415.4

Table 3.13—*Net volume of softwood growing stock on commercial timberland in the eastern United States, by species, section, region, and State, January 1, 1977*

[Million cubic feet]

Section, region and State	Total softwoods	Softwoods: Longleaf and slash pines	Loblolly and shortleaf pines	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
New England:											
Connecticut	425.0	.0	.0	16.1	137.1	.0	.0	193.9	.0	77.9	.0
Maine	16,060.3	.0	.0	.0	1,599.1	.0	11,758.0	1,242.5	.0	1,460.7	.0
Massachusetts	1,438.7	.0	.0	76.3	1,029.2	.0	75.6	241.6	.0	16.0	.0
New Hampshire	3,525.8	.0	.0	.0	1,632.6	.0	1,222.8	635.3	.0	35.1	.0
Rhode Island	107.9	.0	.0	16.6	86.9	.0	.0	1.4	.0	3.0	.0
Vermont	1,825.6	.0	.0	.0	412.2	.0	921.6	404.9	.0	86.9	.0
Total	23,383.3	.0	.0	109.0	4,897.1	.0	13,978.0	2,719.6	.0	1,679.6	.0
Middle Atlantic:											
Delaware	168.5	.0	145.8	22.7	.0	.0	.0	.0	.0	.0	.0
Maryland	793.0	.0	482.9	250.7	42.1	.0	.0	.0	.0	17.3	.0
New Jersey	251.4	.0	28.3	175.2	.0	.0	.0	.0	.0	47.9	.0
New York	3,523.1	.0	.0	23.1	1,410.4	.0	722.8	1,200.1	.0	166.7	.0
Pennsylvania	1,778.1	.0	.0	204.7	645.0	.0	12.6	886.7	.0	29.1	.0
West Virginia	1,091.8	.0	.0	581.1	137.2	.0	174.0	197.5	.0	2.0	.0
Total	7,605.9	.0	657.0	1,257.5	2,234.7	.0	909.4	2,284.3	.0	263.0	.0
Lake States:											
Michigan	5,060.7	.0	.0	.0	839.8	483.3	1,641.1	753.2	.0	1,343.3	.0
Minnesota	3,477.0	.0	.0	.0	629.4	593.7	1,611.5	.0	.0	642.4	.0
North Dakota	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
South Dakota (East)	22.8	.0	.0	.0	.0	.0	.0	.0	.0	.0	22.8
Wisconsin	3,340.1	.0	.0	.0	899.1	555.6	805.8	468.4	.0	611.2	.0
Total	11,900.7	.0	.0	.0	2,368.3	1,632.6	4,058.4	1,221.6	.0	2,596.9	22.9
Central:											
Illinois	23.8	.0	17.6	.0	.0	.0	.0	.0	3.8	2.4	.0
Indiana	87.0	.0	14.6	35.5	.0	.0	.0	.0	10.4	26.5	.0
Iowa	6.2	.0	.0	.0	.0	.0	.0	.0	.0	6.2	.0
Kansas	.6	.0	.0	.0	.0	.0	.0	.0	.0	.6	.0
Kentucky	916.0	.0	.0	702.2	.0	.0	.0	.0	.0	213.8	.0
Missouri	392.2	.0	326.5	.0	.0	.0	.0	.0	6.8	58.9	.0
Nebraska	119.0	.0	.0	.0	.0	1.1	.0	.0	.0	4.2	113.7
Ohio	139.4	.0	.0	90.4	31.4	.0	.0	8.8	.0	8.8	.0
Total	1,684.2	.0	358.7	828.1	31.4	1.1	.0	8.8	21.0	321.4	113.7
Total, North	44,574.1	.0	1,015.7	2,194.6	9,531.5	1,633.7	18,945.8	6,234.3	21.0	4,860.9	136.6
South Atlantic:											
North Carolina	10,741.7	485.9	6,817.4	2,350.2	441.6	.0	20.0	159.7	322.7	144.2	.0
South Carolina	7,079.2	993.3	4,825.8	641.3	21.9	.0	.0	3.9	541.8	51.2	.0
Virginia	5,512.1	.0	2,909.2	2,004.5	359.6	.0	3.3	120.0	48.7	66.8	.0
Total	23,333.0	1,479.2	14,552.4	4,996.0	823.1	.0	23.3	283.6	913.2	262.2	.0
East Gulf:											
Florida	7,524.7	4,383.4	563.1	478.7	.0	.0	.0	.0	2,019.4	80.1	.0
Georgia	16,880.3	5,709.2	9,307.5	917.4	187.8	.0	.0	19.0	720.3	19.1	.0
Total	24,405.0	10,092.6	9,870.6	1,396.1	187.8	.0	.0	19.0	2,739.7	99.2	.0
Central Gulf:											
Alabama	12,339.3	2,218.0	9,279.2	649.3	.0	.0	.0	.0	130.2	62.6	.0
Mississippi	8,929.1	1,266.1	7,306.9	149.5	.0	.0	.0	.0	162.8	43.8	.0
Tennessee	2,287.0	.0	1,039.8	817.6	192.4	.0	.0	70.1	36.8	130.3	.0
Total	23,555.4	3,484.1	17,625.9	1,616.4	192.4	.0	.0	70.1	329.8	236.7	.0
West Gulf:											
Arkansas	7,059.7	.0	6,809.6	.0	.0	.0	.0	.0	193.4	56.7	.0
Louisiana	9,417.1	1,118.4	7,008.3	95.7	.0	.0	.0	.0	1,193.7	1.0	.0
Oklahoma	1,010.4	.0	1,002.4	.0	.0	.0	.0	.0	1.2	6.8	.0
Texas	8,355.7	353.2	7,913.2	.0	.0	.0	.0	.0	66.5	22.8	.0
Total	25,842.9	1,471.6	22,733.5	95.7	.0	.0	.0	.0	1,454.8	87.3	.0
Total, South	97,136.3	16,527.5	64,782.4	8,104.2	1,203.3	.0	23.3	372.7	5,437.5	685.4	.0
Total, eastern United States	141,710.4	16,527.5	65,798.1	10,298.8	10,734.8	1,633.7	18,969.1	6,607.0	5,458.5	5,546.3	136.6

Table 3.14—*Net volume of hardwood growing stock on commercial timberland in the eastern United States, by species, section, region, and State, January 1, 1977*

[Million cubic feet]

Section, region and State	Total hardwoods	Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Basswood	Yellow-poplar	Cottonwood and aspen	Black walnut	Black cherry	Other eastern hardwoods
New England:																			
Connecticut	2,237.4	207.2	489.0	51.2	309.5	128.9	35.2	111.8	439.1	43.7	.0	.0	129.1	.0	.0	14.8	.0	36.0	241.9
Maine	6,543.4	5.9	294.4	.0	5.5	.0	746.8	1,209.2	1,641.7	669.7	.0	.0	297.9	87.2	.0	681.0	.0	.0	904.1
Massachusetts	2,454.3	166.9	484.1	1.3	337.1	70.0	67.1	201.8	583.4	88.2	.0	.0	95.5	.0	.0	51.4	.0	90.7	216.8
New Hampshire	3,760.4	58.1	579.0	.0	43.8	.0	450.8	485.7	940.9	295.3	.0	.0	145.1	.0	.0	169.2	.0	40.9	551.6
Rhode Island	304.1	55.3	54.7	6.9	92.7	4.2	5.8	1.8	68.4	.5	.0	.0	1.9	.0	.0	1.7	.0	1.3	8.9
Vermont	3,164.7	4.6	114.4	.0	.0	.0	348.6	1,138.3	473.2	248.9	.0	.0	190.6	.0	.0	141.7	.0	48.8	455.6
Total	18,464.3	498.0	2,015.6	59.4	788.6	203.1	1,654.3	3,148.6	4,146.7	1,346.3	.0	.0	860.1	87.2	.0	1,059.8	.0	217.7	2,378.9
Middle Atlantic:																			
Delaware	456.2	73.4	6.9	.9	79.8	24.9	.0	.0	82.5	18.0	93.8	19.4	1.4	.0	36.7	.0	.3	4.0	14.2
Maryland	2,699.1	399.5	186.0	180.2	468.1	114.8	.0	33.5	280.6	95.2	221.1	98.8	71.3	.0	350.5	.0	17.6	28.3	153.6
New Jersey	1,282.1	187.1	132.3	148.4	290.6	68.2	.0	23.3	114.9	16.0	79.6	41.3	3.7	.0	30.3	1.5	9.3	15.0	120.6
New York	9,732.5	271.2	871.9	247.9	137.1	277.8	424.4	2,156.3	1,755.5	842.3	.0	.0	651.4	414.2	42.3	452.2	2.7	344.4	840.9
Pennsylvania	21,624.7	1,913.8	3,070.6	2,511.3	1,587.1	622.9	243.8	1,631.9	3,438.4	859.6	.0	102.8	779.1	354.9	662.2	635.6	47.4	1,932.6	1,230.7
West Virginia	13,060.9	1,348.3	1,344.7	1,444.1	1,485.7	1,228.9	149.5	793.7	869.3	637.2	.0	138.0	294.2	216.1	1,471.6	14.0	111.9	472.3	1,041.4
Total	48,855.5	4,193.3	5,612.4	4,532.8	4,048.4	2,337.5	817.7	4,638.7	6,541.2	2,468.3	394.5	400.3	1,801.1	985.2	2,593.6	1,103.3	189.2	2,796.6	3,401.4
Lake States:																			
Michigan	14,153.5	496.9	948.7	.0	497.0	128.1	549.4	2,810.1	1,549.6	521.2	.0	.0	715.3	611.6	9.2	3,300.6	3.6	197.7	1,814.5
Minnesota	7,977.0	358.3	568.9	.0	.0	.0	10.6	189.0	131.9	.0	.0	.0	538.1	402.4	.0	3,410.8	.0	.0	2,367.0
North Dakota	257.3	29.7	.0	.0	.0	.0	.0	.0	8.4	.0	.0	.0	38.8	22.1	.0	115.5	.0	.0	42.8
South Dakota (East)	110.9	5.4	.0	.0	.0	.0	.0	.4	1.8	.0	.0	.0	28.2	3.3	.0	41.3	.3	.0	30.2
Wisconsin	10,117.3	523.7	1,290.9	.0	457.8	120.4	281.5	1,150.0	744.7	34.7	.0	.0	580.2	670.9	.0	2,431.7	10.1	77.5	1,743.2
Total	32,616.0	1,414.0	2,808.5	.0	954.8	248.5	841.5	4,149.5	2,436.4	555.9	.0	.0	1,900.6	1,710.3	9.2	9,299.9	14.0	275.2	5,997.7
Central:																			
Illinois	2,156.0	366.6	126.3	79.2	323.0	233.9	.0	60.3	164.7	6.7	47.2	10.0	151.8	13.4	19.1	76.4	44.6	.0	432.8
Indiana	3,671.0	573.2	277.6	128.3	434.3	485.6	.0	315.8	135.8	134.2	54.3	32.2	213.3	33.3	192.9	97.0	71.3	54.2	437.7
Iowa	1,031.9	227.3	123.6	1.6	42.5	78.4	.0	37.8	107.4	.0	.0	.0	35.0	56.7	.0	106.9	31.4	11.4	171.9
Kansas	583.8	55.4	31.1	13.7	22.6	26.1	.0	2.8	10.3	.0	.0	.0	44.5	4.1	.0	110.5	45.7	.1	216.9
Kentucky	11,051.6	1,586.7	682.9	1,129.6	1,823.9	1,560.6	.0	460.5	427.5	508.9	135.5	231.1	350.4	112.3	1,052.5	33.3	130.2	41.2	784.5
Missouri	5,629.7	1,541.4	299.8	649.5	1,779.7	553.7	.0	38.3	62.2	.3	8.1	34.2	103.4	6.5	1.6	64.2	97.3	8.3	381.2
Nebraska	322.7	36.0	3.9	.8	.0	1.6	.0	.0	.0	.0	.0	.0	33.2	7.3	.0	153.2	3.9	.0	82.8
Ohio	4,188.3	601.8	318.2	257.3	436.5	503.8	.0	249.7	237.5	153.2	.0	.0	278.8	47.5	271.3	60.2	102.9	128.4	541.2
Total	28,635.0	4,988.4	1,863.4	2,260.0	4,862.5	3,443.7	.0	1,165.2	1,145.4	803.3	245.1	307.5	1,210.4	281.1	1,537.4	701.7	527.3	243.6	3,049.0
Total, North	128,570.8	11,093.7	12,299.9	6,852.2	10,654.3	6,232.8	3,313.5	13,102.0	14,269.7	5,173.8	639.6	707.8	5,772.2	3,063.8	4,140.2	12,164.7	730.5	3,533.1	14,827.0

Table 3.14—*Net volume of hardwood growing stock on commercial timberland in the eastern United States, by species, section, region, and State, January 1, 1977—Cont'd.*

[Million cubic feet]

Section, region and State	Total hardwoods	Hardwoods: Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Basswood	Yellow-poplar	Cottonwood and aspen	Black walnut	Black cherry	Other eastern hardwoods
South Atlantic:																			
North Carolina	15,389.0	1,659.6	741.6	1,207.0	2,220.2	874.6	46.3	92.9	1,261.0	258.4	1,630.7	1,696.6	329.9	75.9	2,143.1	23.2	29.1	51.0	1,047.9
South Carolina	7,121.4	467.4	163.6	282.9	1,502.1	329.9	.0	4.9	401.8	29.3	1,346.5	1,440.3	255.9	1.1	405.0	64.4	4.2	5.6	416.5
Virginia	14,144.4	2,263.6	1,019.8	1,719.2	2,296.4	1,089.8	6.6	134.2	808.1	342.4	739.9	336.2	188.2	111.8	2,163.5	5.1	77.2	32.0	810.4
Total	36,654.8	4,390.6	1,925.0	3,209.1	6,018.7	2,294.3	52.9	232.0	2,470.9	630.1	3,717.1	3,473.1	774.0	188.8	4,711.6	92.7	110.5	88.6	2,274.8
East Gulf:																			
Florida	4,208.0	33.1	5.5	319.0	817.8	118.4	.0	12.7	292.5	10.8	404.7	1,212.6	280.0	19.5	35.4	1.6	.0	4.4	640.0
Georgia	11,521.4	811.2	319.8	768.1	2,533.7	737.7	.0	9.8	563.9	44.3	1,819.7	1,886.9	259.0	13.0	995.2	8.0	6.1	39.8	705.2
Total	15,729.4	844.3	325.3	1,087.1	3,351.5	856.1	.0	22.5	856.4	55.1	2,224.4	3,099.5	539.0	32.5	1,030.6	9.6	6.1	44.2	1,345.2
Central Gulf:																			
Alabama	9,900.5	862.4	305.5	722.7	2,106.0	1,104.0	.0	18.8	196.8	82.7	1,625.9	998.2	264.6	33.0	622.0	33.0	9.4	22.5	893.0
Mississippi	8,304.6	741.9	456.6	548.0	2,024.1	622.0	.0	6.8	104.9	82.7	1,360.9	599.2	212.5	15.6	369.8	126.0	5.8	43.7	984.1
Tennessee	10,216.9	1,551.6	662.2	1,207.7	1,769.4	1,417.0	.0	237.2	312.7	165.8	400.1	232.6	308.2	62.9	863.7	66.1	86.0	64.3	809.4
Total	28,422.0	3,155.9	1,424.3	2,478.4	5,899.5	3,143.0	.0	262.8	614.4	331.2	3,386.9	1,830.0	785.3	111.5	1,855.5	225.1	101.2	130.5	2,686.5
West Gulf:																			
Arkansas	10,085.5	1,413.9	703.8	1,379.5	2,222.4	1,165.5	.0	28.7	68.8	57.1	1,295.8	354.4	253.7	16.0	3.0	90.7	34.0	25.1	973.1
Louisiana	8,013.8	344.1	198.4	534.7	1,608.2	595.5	.0	3.6	162.1	149.5	1,464.6	1,229.5	425.0	6.9	29.3	111.2	1.6	11.8	1,137.8
Oklahoma	1,051.1	96.4	63.8	258.5	243.1	140.8	.0	1.0	8.5	.0	28.8	19.0	40.0	.5	.0	23.6	2.5	1.9	122.7
Texas	4,916.4	289.7	216.1	677.9	1,428.5	335.8	.0	5.5	41.7	31.9	892.4	250.5	169.8	2.6	.0	48.9	3.9	2.5	518.7
Total	24,066.8	2,144.1	1,182.1	2,850.6	5,502.2	2,237.6	.0	38.8	281.1	238.5	3,681.6	1,853.4	888.5	26.0	32.3	274.4	42.0	41.3	2,752.3
Total, South	104,873.0	10,534.9	4,856.7	9,625.2	20,771.9	8,531.0	52.9	556.1	4,222.8	1,254.9	13,010.0	10,256.0	2,986.8	358.8	7,630.0	601.8	259.8	304.6	9,058.8
Total, eastern United States	233,443.8	21,628.6	17,156.6	16,477.4	31,426.2	14,763.8	3,366.4	13,658.1	18,492.5	6,428.7	13,649.6	10,963.8	8,759.0	3,422.6	11,770.2	12,766.5	990.3	3,837.7	23,885.8

Table 3.15—*Net volume of softwood sawtimber on commercial timberland in the eastern United States, by species, section, region, and State, January 1, 1977*

[Million board feet, International 1/4-inch log rule]

Section, region and State	Total softwoods	Softwoods									
		Longleaf and slash pines	Loblolly and shortleaf pines	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
New England:											
Connecticut	1,305.4	.0	.0	26.0	437.4	.0	.0	650.9	.0	191.1	.0
Maine	25,231.7	.0	.0	.0	4,725.6	.0	15,076.7	2,845.8	.0	2,583.6	.0
Massachusetts	4,167.7	.0	.0	212.4	3,175.6	.0	193.5	534.7	.0	51.5	.0
New Hampshire	8,606.7	.0	.0	.0	4,825.9	.0	2,025.3	1,654.2	.0	101.3	.0
Rhode Island	288.7	.0	.0	36.4	243.3	.0	.0	3.7	.0	5.3	.0
Vermont	4,199.4	.0	.0	.0	1,153.2	.0	1,769.6	1,137.6	.0	139.0	.0
Total	43,799.6	.0	.0	274.8	14,561.0	.0	19,065.1	6,826.9	.0	3,071.8	.0
Middle Atlantic:											
Delaware	408.1	.0	362.4	45.7	.0	.0	.0	.0	.0	.0	.0
Maryland	1,726.4	.0	1,238.9	420.4	29.1	.0	.0	.0	.0	38.0	.0
New Jersey	574.6	.0	80.5	368.7	.0	.0	.0	.0	.0	125.4	.0
New York	7,770.7	.0	.0	44.6	3,312.8	.0	1,271.3	2,896.5	.0	245.5	.0
Pennsylvania	3,713.5	.0	.0	390.3	1,504.3	.0	9.3	1,790.9	.0	18.7	.0
West Virginia	2,901.1	.0	.0	1,340.0	368.9	.0	629.8	555.1	.0	7.3	.0
Total	17,094.4	.0	1,681.8	2,609.7	5,215.1	.0	1,910.4	5,242.5	.0	434.9	.0
Lake States:											
Michigan	13,204.9	.0	.0	.0	3,889.5	481.4	2,404.0	3,713.2	.0	2,716.8	.0
Minnesota	8,530.6	.0	.0	.0	3,021.3	1,566.5	2,447.3	.0	.0	1,495.5	.0
North Dakota	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
South Dakota (East)	66.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	66.1
Wisconsin	9,182.7	.0	.0	.0	3,885.8	815.4	1,037.4	2,215.8	.0	1,228.3	.0
Total	30,984.3	.0	.0	.0	10,796.6	2,863.3	5,888.7	5,929.0	.0	5,440.6	66.1
Central:											
Illinois	29.6	.0	3.3	.0	.0	.0	.0	.0	24.5	1.8	.0
Indiana	254.7	.0	17.7	110.7	.0	.0	.0	.0	69.7	56.6	.0
Iowa	13.8	.0	.0	.0	.0	.0	.0	.0	.0	13.8	.0
Kansas	.6	.0	.0	.0	.0	.0	.0	.0	.0	.6	.0
Kentucky	2,091.3	.0	.0	1,677.3	.0	.0	.0	.0	.0	414.0	.0
Missouri	1,292.3	.0	1,136.9	.0	.0	.0	.0	.0	31.6	123.8	.0
Nebraska	509.9	.0	.0	.0	.0	1.0	.0	.0	.0	7.0	501.9
Ohio	433.0	.0	.0	311.2	63.8	.0	.0	33.5	.0	24.5	.0
Total	4,625.2	.0	1,157.9	2,099.2	63.8	1.0	.0	33.5	125.8	642.1	501.9
Total, North	96,503.5	.0	2,839.7	4,983.7	30,636.5	2,864.3	26,864.2	18,031.9	125.8	9,589.4	568.0
South Atlantic:											
North Carolina	35,374.6	1,683.5	24,080.7	5,295.1	1,863.6	.0	56.6	733.4	1,294.6	367.1	.0
South Carolina	22,808.6	3,085.2	15,688.4	1,897.0	78.9	.0	.0	14.7	1,976.1	68.3	.0
Virginia	16,134.1	.0	9,632.3	4,306.5	1,365.0	.0	12.4	505.3	236.6	76.0	.0
Total	74,317.3	4,768.7	49,401.4	11,498.6	3,307.5	.0	69.0	1,253.4	3,507.3	511.4	.0
East Gulf:											
Florida	21,129.0	11,745.0	2,187.1	1,120.2	.0	.0	.0	.0	5,831.7	245.0	.0
Georgia	52,949.1	16,889.1	30,327.9	2,486.1	885.2	.0	.0	92.7	2,228.8	39.3	.0
Total	74,078.1	28,634.1	32,515.0	3,606.3	885.2	.0	.0	92.7	8,060.5	284.3	.0
Central Gulf:											
Alabama	46,508.8	8,717.6	35,151.7	1,858.2	.0	.0	.0	.0	673.4	107.9	.0
Mississippi	35,370.0	4,899.0	28,865.9	739.6	.0	.0	.0	.0	766.8	98.7	.0
Tennessee	6,024.4	.0	2,526.9	2,146.7	792.9	.0	.0	269.0	167.9	121.0	.0
Total	87,903.2	13,616.6	66,544.5	4,744.5	792.9	.0	.0	269.0	1,608.1	327.6	.0
West Gulf:											
Arkansas	26,461.5	.0	25,442.2	.0	.0	.0	.0	.0	963.4	55.9	.0
Louisiana	38,647.8	3,713.1	29,569.2	430.9	.0	.0	.0	.0	4,932.2	2.4	.0
Oklahoma	3,575.8	.0	3,557.3	.0	.0	.0	.0	.0	7.4	11.1	.0
Texas	36,038.8	1,078.1	34,619.3	.0	.0	.0	.0	.0	289.3	52.1	.0
Total	104,723.9	4,791.2	93,188.0	430.9	.0	.0	.0	.0	6,192.3	121.5	.0
Total, South	341,022.5	51,810.6	241,648.9	20,280.3	4,985.6	.0	69.0	1,615.1	19,368.2	1,244.8	.0
Total, eastern United States	437,526.0	51,810.6	244,488.6	25,264.0	35,622.1	2,864.3	26,933.2	19,647.0	19,494.0	10,834.2	568.0

Table 3.16—*Net volume of hardwood sawtimber in the eastern United States, by species, section, region, and State, January 1, 1977*

[Million board feet, International 1/4-inch log rule]

Section, region and State	Total hardwoods	Hardwoods: Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Basswood	Yellow-poplar	Cottonwood and aspen	Black walnut	Black cherry	Other eastern hardwoods
New England:																			
Connecticut	4,564.2	443.8	1,372.6	76.5	867.0	219.5	52.8	221.5	519.7	85.1	.0	.0	256.8	.0	.0	5.0	.0	51.6	392.3
Maine	10,886.2	15.9	654.9	.0	7.2	.0	1,575.1	3,072.7	2,133.3	1,006.3	.0	.0	494.3	204.8	.0	712.2	.0	.0	1,009.5
Massachusetts	3,700.1	274.0	1,013.5	5.1	633.5	115.5	76.2	335.5	542.8	169.6	.0	.0	173.7	.0	.0	57.4	.0	74.6	228.7
New Hampshire	5,957.0	62.0	1,283.7	.0	87.7	.0	1,008.3	950.5	1,093.2	576.7	.0	.0	219.2	.0	.0	143.6	.0	21.7	510.4
Rhode Island	407.9	66.9	59.7	3.1	156.8	5.4	9.3	.0	86.4	1.9	.0	.0	3.6	.0	.0	3.1	.0	2.4	9.3
Vermont	6,191.8	7.0	326.2	.0	.0	.0	779.2	2,457.5	790.8	595.3	.0	.0	325.3	.0	.0	163.8	.0	78.7	668.0
Total	31,707.2	869.6	4,710.6	84.7	1,752.2	340.4	3,500.9	7,037.7	5,166.2	2,434.9	.0	.0	1,472.9	204.8	.0	1,085.1	.0	229.0	2,818.2
Middle Atlantic:																			
Delaware	984.6	156.6	14.0	2.7	189.0	54.4	.0	.0	157.7	56.2	156.0	47.5	3.1	.0	114.9	.0	.0	6.1	26.4
Maryland	6,440.2	1,005.4	481.0	381.5	1,216.0	253.4	.0	50.5	515.3	287.8	454.8	213.2	133.5	.0	1,070.0	.0	34.6	42.9	300.3
New Jersey	2,552.4	403.6	385.2	297.2	632.0	108.4	.0	54.3	127.8	34.7	157.3	49.8	6.0	.0	103.6	5.3	15.6	12.1	159.5
New York	18,317.2	691.8	2,101.5	439.0	306.8	422.7	994.3	4,075.6	2,463.1	1,895.7	.0	.0	1,025.2	942.0	131.7	587.9	.0	742.4	1,497.5
Pennsylvania	30,537.8	2,922.7	5,807.3	2,965.3	2,945.2	870.8	209.1	1,795.3	3,305.6	1,279.6	.0	117.8	1,184.5	520.8	1,579.2	304.7	73.1	3,351.2	1,305.6
West Virginia	26,032.8	2,775.6	3,327.8	2,878.3	3,486.7	1,791.6	171.1	1,204.8	1,131.1	1,516.7	.0	307.6	615.1	434.1	3,399.2	13.2	215.3	1,157.8	1,606.8
Total	84,865.0	7,955.7	12,116.8	6,964.0	8,775.7	3,501.3	1,374.5	7,180.5	7,700.6	5,070.7	768.1	735.9	2,967.4	1,896.9	6,398.6	911.1	338.6	5,312.5	4,896.1
Lake States:																			
Michigan	29,236.1	1,220.9	2,516.1	.0	1,188.6	316.5	1,727.2	7,012.9	2,892.1	1,877.2	.0	.0	1,033.2	1,294.3	33.6	4,627.6	12.8	234.6	3,248.5
Minnesota	16,076.6	1,076.0	1,763.6	.0	.0	.0	39.9	489.6	282.0	.0	.0	.0	994.0	1,116.8	.0	5,974.8	.0	.0	4,339.9
North Dakota	473.5	46.8	.0	.0	.0	.0	.0	.0	8.3	.0	.0	.0	66.5	78.6	.0	135.3	.0	.0	138.0
South Dakota (East)	381.7	9.7	.0	.0	.0	.0	.0	.0	4.3	.0	.0	.0	64.7	2.3	.0	188.3	1.2	.0	111.2
Wisconsin	20,613.9	1,481.7	3,947.4	.0	1,118.0	143.8	868.3	2,881.9	1,325.1	118.7	.0	.0	1,031.1	1,359.0	.0	2,873.1	31.4	96.2	3,338.2
Total	66,781.8	3,835.1	8,227.1	.0	2,306.6	460.3	2,635.4	10,384.4	4,511.8	1,995.9	.0	.0	3,189.5	3,851.0	33.6	13,799.1	45.4	330.8	11,175.8
Central:																			
Illinois	7,064.4	1,443.7	587.9	224.5	1,096.4	546.8	.0	197.1	520.2	35.5	184.1	34.5	355.7	50.9	78.3	334.3	101.4	.0	1,273.1
Indiana	10,712.4	1,769.5	1,031.6	439.3	1,568.8	1,225.7	.0	763.3	326.1	481.2	132.8	98.0	496.8	111.3	652.8	317.0	184.0	107.2	1,007.0
Iowa	3,405.5	796.2	501.1	4.7	141.2	161.2	.0	134.5	354.4	.0	.0	.0	97.1	195.5	.0	464.0	86.6	23.1	445.9
Kansas	2,018.9	222.7	108.2	22.2	84.0	73.3	.0	6.6	32.4	.0	.0	.0	110.8	16.6	.0	466.1	114.4	.0	761.6
Kentucky	26,850.0	3,994.3	2,156.8	2,912.8	5,071.0	3,138.9	.0	890.5	806.7	1,760.3	278.2	541.6	693.3	267.6	2,508.3	75.0	249.5	65.6	1,439.6
Missouri	13,977.3	3,958.3	1,013.8	1,170.2	4,573.5	1,036.9	.0	56.6	205.2	1.4	23.9	101.1	215.8	18.7	4.5	301.0	220.7	22.3	1,053.4
Nebraska	1,226.9	102.8	17.9	3.4	.0	5.4	.0	.0	.0	.0	.0	.0	117.9	26.8	.0	634.0	13.4	.0	305.3
Ohio	13,907.7	2,308.1	1,218.5	827.5	1,705.4	1,214.9	.0	791.3	766.5	766.7	.0	.0	840.1	180.2	1,075.5	105.2	292.8	289.1	1,525.9
Total	79,163.1	14,595.6	6,635.8	5,604.6	14,240.3	7,403.1	.0	2,839.9	3,011.5	3,045.1	619.0	775.2	2,927.5	867.6	4,319.4	2,696.6	1,262.8	507.3	7,811.8
Total, North	262,517.1	27,256.0	31,690.3	12,653.3	27,074.8	11,705.1	7,510.8	27,442.5	20,390.1	12,546.6	1,387.1	1,511.1	10,557.3	6,820.3	10,751.6	18,491.9	1,646.8	6,379.6	26,701.9

Table 3.16—*Net volume of hardwood sawtimber in the eastern United States, by species, section, region, and State, January 1, 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section, region and State	Total hardwoods	Hardwoods: Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Basswood	Yellow-poplar	Cottonwood and aspen	Black walnut	Black cherry	Other eastern hardwoods
South Atlantic:																			
North Carolina	41,419.2	4,636.9	2,407.6	3,656.2	5,919.9	2,508.1	97.8	278.6	2,397.7	692.4	4,159.8	4,781.6	790.0	219.3	6,405.6	77.9	59.3	94.0	2,236.5
South Carolina	18,028.1	1,024.6	469.8	714.8	3,730.6	892.8	.0	9.0	831.4	81.3	3,560.3	3,783.8	550.1	4.1	1,231.8	189.1	10.0	2.6	942.0
Virginia	37,636.5	5,997.8	3,241.0	4,506.5	5,838.2	2,700.5	19.6	347.9	1,554.5	1,043.5	1,832.6	814.9	489.9	358.4	6,812.2	12.1	177.8	74.3	1,814.8
Total	97,083.8	11,659.3	6,118.4	8,877.5	15,488.7	6,101.4	117.4	635.5	4,783.6	1,817.2	9,552.7	9,380.3	1,830.0	581.8	14,449.6	279.1	247.1	170.9	4,993.3
East Gulf:																			
Florida	10,820.6	119.3	11.2	1,174.9	2,260.9	361.6	.0	35.5	704.7	41.4	997.8	2,947.7	661.6	51.3	101.7	6.6	.0	11.2	1,333.2
Georgia	27,579.7	2,028.8	926.3	1,971.9	6,396.5	1,892.3	.0	18.1	1,131.0	185.0	3,856.3	3,886.2	577.1	33.1	3,091.7	36.9	12.8	28.7	1,507.0
Total	38,400.3	2,148.1	937.5	3,146.8	8,657.4	2,253.9	.0	53.6	1,835.7	226.4	4,854.1	6,833.9	1,238.7	84.4	3,193.4	43.5	12.8	39.9	2,840.2
Central Gulf:																			
Alabama	22,887.2	2,569.1	1,097.2	1,670.1	5,604.9	2,260.3	.0	25.1	289.6	251.3	3,074.3	2,135.7	626.3	86.5	1,602.2	83.9	20.5	16.3	1,473.9
Mississippi	25,271.6	2,598.1	1,740.2	1,519.1	6,356.7	2,155.0	.0	18.0	162.3	384.3	3,179.0	1,591.9	562.6	54.0	1,427.9	642.3	22.0	93.6	2,764.6
Tennessee	26,289.0	3,812.3	2,163.5	3,029.0	4,824.6	3,410.2	.0	557.9	542.0	537.4	1,018.7	498.9	759.6	200.2	2,571.7	336.3	177.0	90.3	1,759.4
Total	74,447.8	8,979.5	5,000.9	6,218.2	16,786.2	7,825.5	.0	601.0	993.9	1,173.0	7,272.0	4,226.5	1,948.5	340.7	5,601.8	1,062.5	219.5	200.2	5,997.9
West Gulf:																			
Arkansas	22,507.0	2,575.8	1,832.7	2,797.3	5,305.9	2,351.7	.0	42.7	108.9	213.8	3,028.6	981.0	565.2	49.6	11.2	355.3	59.6	38.8	2,188.9
Louisiana	24,770.5	1,191.7	708.8	1,777.2	5,221.3	2,105.8	.0	7.2	242.8	678.9	4,180.2	3,243.5	1,140.4	11.9	103.2	475.6	3.5	25.9	3,652.6
Oklahoma	2,490.9	218.3	190.9	458.5	653.9	307.2	.0	1.9	24.2	.0	78.1	66.6	75.0	.0	.0	85.2	7.2	1.8	322.1
Texas	13,985.7	957.1	880.5	1,783.8	4,340.3	994.7	.0	7.6	44.6	124.3	2,108.5	695.8	445.5	9.5	.0	245.9	8.7	4.6	1,334.3
Total	63,754.1	4,942.9	3,612.9	6,816.8	15,521.4	5,759.4	.0	59.4	420.5	1,017.0	9,395.4	4,986.9	2,226.1	71.0	114.4	1,162.0	79.0	71.1	7,497.9
Total, South	273,686.0	27,729.8	15,669.7	25,059.3	56,453.7	21,940.2	117.4	1,349.5	8,033.7	4,233.6	31,074.2	25,427.6	7,243.3	1,077.9	23,359.2	2,547.1	558.4	482.1	21,329.3
Total, eastern United States	536,203.0	54,985.8	47,360.0	37,712.6	83,528.5	33,645.3	7,628.2	28,792.0	28,423.8	16,780.2	32,461.3	26,938.7	17,800.6	7,898.2	34,110.8	21,039.0	2,205.2	6,861.7	48,031.2

Table 3.17—*Net volume of growing stock on commercial timberland in the western United States, by species, section, region, and State, January 1, 1977*

[Million cubic feet]

Section, region and State	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True firs	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense cedar	Lodgepole pine	Other western softwoods	Hardwoods: Total hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Pacific Northwest:																					
Alaska:																					
Coastal	38,573.5	38,188.9	.0	.0	150.7	25,459.7	.0	.0	.0	8,835.1	.0	.0	1,619.3	.0	47.7	2,076.4	384.6	260.1	124.5	.0	.0
Interior	4,499.2	2,431.0	.0	.0	.0	.0	.0	.0	.0	.0	2,431.0	.0	.0	.0	.0	.0	2,068.2	822.3	.0	.0	1,245.9
Summary	43,072.7	40,619.9	.0	.0	150.7	25,459.7	.0	.0	.0	8,835.1	2,431.0	.0	1,619.3	.0	47.7	2,076.4	2,452.8	1,082.4	124.5	.0	1,245.9
Oregon:																					
Western	57,397.0	52,603.0	35,987.0	640.0	4,175.0	7,495.0	696.0	440.0	91.0	617.0	65.0	26.0	1,248.0	549.0	261.0	313.0	4,794.0	56.0	2,593.0	373.0	1,772.0
Eastern	22,157.0	22,132.0	3,262.0	8,257.0	4,464.0	570.0	65.0	98.0	.0	.0	565.0	904.0	7.0	99.0	3,835.0	6.0	25.0	19.0	2.0	3.0	1.0
Summary	79,554.0	74,735.0	39,249.0	8,897.0	8,639.0	8,065.0	761.0	538.0	91.0	617.0	630.0	930.0	1,255.0	648.0	4,096.0	319.0	4,819.0	75.0	2,595.0	376.0	1,773.0
Washington:																					
Western	46,614.0	41,082.0	15,303.0	32.0	5,736.0	15,689.0	.0	107.0	.0	585.0	31.0	10.0	3,335.0	.0	137.0	117.0	5,532.0	190.0	4,189.0	.0	1,153.0
Eastern	16,889.0	16,718.0	5,690.0	3,704.0	2,576.0	553.0	.0	243.0	.0	.0	612.0	1,628.0	230.0	.0	1,415.0	67.0	171.0	110.0	5.0	.0	56.0
Summary	63,503.0	57,800.0	20,993.0	3,736.0	8,312.0	16,242.0	.0	350.0	.0	585.0	643.0	1,638.0	3,565.0	.0	1,552.0	184.0	5,703.0	300.0	4,194.0	.0	1,209.0
Total	186,129.7	173,154.9	60,242.0	12,633.0	17,101.7	49,766.7	761.0	888.0	91.0	10,037.1	3,704.0	2,568.0	6,439.3	648.0	5,695.7	2,579.4	12,974.8	1,457.4	6,913.5	376.0	4,227.9
Pacific Southwest:																					
California	49,668.0	45,975.0	12,786.0	9,124.0	12,804.0	129.0	3,355.0	231.0	4,302.0	48.0	7.0	.0	18.0	2,004.0	870.0	297.0	3,693.0	21.0	64.0	1,796.0	1,812.0
Hawaii	202.0	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	4.0	198.0	.0	.0	.0	198.0
Total	49,870.0	45,979.0	12,786.0	9,124.0	12,804.0	129.0	3,355.0	231.0	4,302.0	48.0	7.0	.0	18.0	2,004.0	870.0	301.0	3,891.0	21.0	64.0	1,796.0	2,010.0
Total, Pacific Coast	235,999.7	219,133.9	73,028.0	21,757.0	29,905.7	49,895.7	4,116.0	1,119.0	4,393.0	10,085.1	3,711.0	2,568.0	6,457.3	2,652.0	6,565.7	2,880.4	16,865.8	1,478.4	6,977.5	2,172.0	6,237.9
Northern Rocky Mtn.:																					
Idaho	31,883.7	31,661.6	8,557.1	3,081.3	6,867.2	1,138.8	.0	1,912.7	.0	.0	2,119.7	1,608.3	2,006.5	.0	3,999.8	370.2	222.1	148.9	.0	.0	73.2
Montana	27,977.1	27,690.5	8,122.6	2,365.3	2,102.5	318.5	.0	259.2	.0	.0	2,102.5	2,267.7	299.2	.0	9,105.2	747.8	286.6	254.1	.0	.0	32.5
South Dakota (West)	1,643.0	1,626.7	.0	1,565.2	.0	.0	.0	.0	.0	.0	61.5	.0	.0	.0	.0	.0	16.3	9.4	.0	.0	6.9
Wyoming	7,194.7	6,962.9	608.2	822.1	789.1	.0	.0	.0	.0	.0	1,609.6	.0	.0	.0	2,803.2	330.7	231.8	230.7	.0	.0	1.1
Total	68,698.5	67,941.7	17,287.9	7,833.9	9,758.8	1,457.3	.0	2,171.9	.0	.0	5,893.3	3,876.0	2,305.7	.0	15,908.2	1,448.7	756.8	643.1	.0	.0	113.7
Southern Rocky Mtn.:																					
Arizona	4,982.2	4,762.6	336.8	3,842.4	226.8	.0	.0	.0	.0	.0	294.4	.0	.0	.0	.0	62.2	219.6	219.6	.0	.0	.0
Colorado	15,035.9	12,623.5	1,187.9	891.0	2,059.8	.0	.0	.0	.0	.0	5,301.7	.0	.0	.0	3,067.5	115.6	2,412.4	2,411.2	.0	.0	1.2
Nevada	262.3	249.3	.0	84.9	92.0	4.7	1.0	12.3	.0	.0	19.8	.0	.0	1.2	20.5	12.9	13.0	13.0	.0	.0	.0
New Mexico	6,395.2	5,796.0	1,004.3	3,366.5	667.2	.0	.0	.0	.0	.0	588.3	.0	.0	.0	.0	169.7	599.2	599.2	.0	.0	.0
Utah	4,439.9	3,561.7	656.7	307.3	786.0	.0	.0	.0	.0	.0	896.1	.0	.0	.0	859.6	56.0	878.2	878.2	.0	.0	.0
Total	31,115.5	26,993.1	3,185.7	8,492.1	3,831.8	4.7	1.0	12.3	.0	.0	7,100.3	.0	.0	1.2	3,947.6	416.4	4,122.4	4,121.2	.0	.0	1.2
Total, Rocky Mtn	99,814.0	94,934.8	20,473.6	16,326.0	13,590.6	1,462.0	1.0	2,184.2	.0	.0	12,993.6	3,876.0	2,305.7	1.2	19,855.8	1,865.1	4,879.2	4,764.3	.0	.0	114.9
Total, western United States	335,813.7	314,068.7	93,501.6	38,083.0	43,496.3	51,357.7	4,117.0	3,303.2	4,393.0	10,085.1	16,704.6	6,444.0	8,763.0	2,653.2	26,421.5	4,745.5	21,745.0	6,242.7	6,977.5	2,172.0	6,352.8

Table 3.18—*Net volume of sawtimber on commercial timberland in the western United States, by species, section, region, and State, January 1, 1977*

[Million board feet, International 1/4-inch log rule]

Section, region and State	All species	Softwoods															Hardwoods				
		Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True firs	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense cedar	Lodgepole pine	Other western softwoods	Total hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Pacific Northwest:																					
Alaska:																					
Coastal	175,959.5	174,604.0	.0	.0	687.7	114,686.3	.0	.0	.0	42,653.0	.0	.0	7,440.0	.0	210.2	8,926.8	1,355.5	1,013.2	342.3	.0	.0
Interior	12,898.0	9,801.8	.0	.0	.0	.0	.0	.0	.0	.0	9,801.8	.0	.0	.0	.0	.0	3,096.2	1,731.2	.0	.0	1,365.0
Summary	188,857.5	184,405.8	.0	.0	687.7	114,686.3	.0	.0	.0	42,653.0	9,801.8	.0	7,440.0	.0	210.2	8,926.8	4,451.7	2,744.4	342.3	.0	1,365.0
Oregon:																					
Western	327,580.0	310,664.0	221,540.0	3,693.0	22,021.0	40,169.0	4,260.0	2,578.0	573.0	3,811.0	368.0	147.0	6,681.0	2,676.0	778.0	1,369.0	16,916.0	321.0	9,856.0	925.0	5,814.0
Eastern	103,592.0	103,522.0	16,221.0	45,672.0	19,863.0	2,800.0	325.0	527.0	.0	.0	2,934.0	4,694.0	38.0	422.0	10,009.0	17.0	70.0	54.0	6.0	10.0	.0
Summary	431,172.0	414,186.0	237,761.0	49,365.0	41,884.0	42,969.0	4,585.0	3,105.0	573.0	3,811.0	3,302.0	4,841.0	6,719.0	3,098.0	10,787.0	1,386.0	16,986.0	375.0	9,862.0	935.0	5,814.0
Washington:																					
Western	251,976.0	235,390.0	87,634.0	180.0	34,820.0	88,647.0	.0	637.0	.0	3,727.0	170.0	63.0	18,217.0	.0	530.0	765.0	16,586.0	1,041.0	11,167.0	.0	4,378.0
Eastern	78,320.0	77,910.0	27,559.0	19,095.0	11,378.0	3,095.0	.0	1,313.0	.0	.0	3,044.0	7,632.0	950.0	.0	3,534.0	310.0	410.0	319.0	9.0	.0	82.0
Summary	330,296.0	313,300.0	115,193.0	19,275.0	46,198.0	91,742.0	.0	1,950.0	.0	3,727.0	3,214.0	7,695.0	19,167.0	.0	4,064.0	1,075.0	16,996.0	1,360.0	11,176.0	.0	4,460.0
Total	950,325.5	911,891.8	352,954.0	68,640.0	88,769.7	249,397.3	4,585.0	5,055.0	573.0	50,191.0	16,317.8	12,536.0	33,326.0	3,098.0	15,061.2	11,387.8	38,433.7	4,479.4	21,380.3	935.0	11,639.0
Pacific Southwest:																					
California	263,669.0	255,594.0	72,938.0	51,300.0	71,951.0	627.0	20,410.0	1,245.0	21,434.0	268.0	9.0	.0	101.0	9,583.0	4,142.0	1,586.0	8,075.0	52.0	179.0	4,430.0	3,414.0
Hawaii	1,047.0	17.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	17.0	1,030.0	.0	.0	.0	1,030.0
Total	264,716.0	255,611.0	72,938.0	51,300.0	71,951.0	627.0	20,410.0	1,245.0	21,434.0	268.0	9.0	.0	101.0	9,583.0	4,142.0	1,603.0	9,105.0	52.0	179.0	4,430.0	4,444.0
Total, Pacific Coast	1,215,041.5	1,167,502.8	425,892.0	119,940.0	160,720.7	250,024.3	24,995.0	6,300.0	22,007.0	50,459.0	16,326.8	12,536.0	33,427.0	12,681.0	19,203.2	12,990.8	47,538.7	4,531.4	21,559.3	5,365.0	16,083.0
Northern Rocky Mtn.:																					
Idaho	139,617.8	139,049.7	39,663.4	16,480.0	30,334.1	5,434.1	.0	9,128.8	.0	.0	10,447.6	7,106.8	8,821.6	.0	10,993.8	639.5	568.1	505.9	.0	.0	62.2
Montana	97,333.5	96,238.0	31,850.7	10,345.7	6,741.6	1,438.6	.0	1,277.7	.0	.0	9,700.7	10,678.8	1,593.0	.0	20,168.8	2,442.4	1,095.5	1,031.5	.0	.0	64.0
South Dakota (West)	5,615.3	5,597.0	.0	5,337.9	.0	.0	.0	.0	.0	.0	259.1	.0	.0	.0	.0	.0	18.3	6.9	.0	.0	11.4
Wyoming	27,079.2	26,682.6	2,750.2	2,721.3	2,475.5	.0	.0	.0	.0	.0	7,749.9	.0	.0	.0	9,686.5	1,299.2	396.6	393.7	.0	.0	2.9
Total	269,645.8	267,567.3	74,264.3	34,884.9	39,551.2	6,872.7	.0	10,406.5	.0	.0	28,157.3	17,785.6	10,414.6	.0	40,849.1	4,381.1	2,078.5	1,938.0	.0	.0	140.5
Southern Rocky Mtn.:																					
Arizona	22,710.7	22,063.0	1,596.7	17,508.9	1,118.4	.0	.0	.0	.0	.0	1,545.3	.0	.0	.0	.0	293.7	647.7	647.7	.0	.0	.0
Colorado	54,940.5	50,684.0	4,615.4	3,794.7	7,284.8	.0	.0	.0	.0	.0	25,797.1	.0	.0	.0	8,798.2	393.8	4,256.5	4,254.5	.0	.0	2.0
Nevada	1,388.3	1,363.1	.0	454.6	535.8	26.9	5.9	72.4	.0	.0	96.0	.0	.0	6.4	102.6	62.5	25.2	25.2	.0	.0	.0
New Mexico	25,919.0	24,345.6	4,809.6	13,925.4	2,368.9	.0	.0	.0	.0	.0	2,599.3	.0	.0	.0	.0	642.4	1,573.4	1,573.4	.0	.0	.0
Utah	15,565.0	14,356.5	3,138.5	1,561.9	2,959.8	.0	.0	.0	.0	.0	3,970.2	.0	.0	.0	2,481.7	244.4	1,208.5	1,208.5	.0	.0	.0
Total	120,523.5	112,812.2	14,160.2	37,245.5	14,267.7	26.9	5.9	72.4	.0	.0	34,007.9	.0	.0	6.4	11,382.5	1,636.8	7,711.3	7,709.3	.0	.0	2.0
Total, Rocky Mtn	390,169.3	380,379.5	88,424.5	72,130.4	53,818.9	6,899.6	5.9	10,478.9	.0	.0	62,165.2	17,785.6	10,414.6	6.4	52,231.6	6,017.9	9,789.8	9,647.3	.0	.0	142.5
Total, western United States	1,605,210.7	1,547,882.2	514,316.5	192,070.4	214,539.6	256,923.9	25,000.9	16,778.9	22,007.0	50,459.0	78,492.0	30,321.6	43,841.6	12,687.4	71,434.8	19,008.7	57,328.5	14,178.7	21,559.3	5,365.0	16,225.5

Table 3.19—*Net volume of softwood growing stock on commercial timberland in the United States, by diameter class, section, and region, 1952, 1962, 1970, and 1977*

[Million cubic feet]

Section and region	Year	Total	Diameter class (inches) 5.0 to 6.9	7.0 to 8.9	9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0+
New England	1977	23,383.3	6,248.3	5,644.8	4,122.3	2,785.9	1,746.2	1,144.3	691.0	377.5	523.6	99.4
	1970	20,935.1	5,593.3	5,160.6	3,720.6	2,477.0	1,589.9	976.8	577.0	332.4	446.7	60.8
	1962	17,683.8	4,828.5	4,372.4	2,993.6	1,987.1	1,348.7	829.0	485.0	316.3	465.5	57.7
	1952	14,354.1	3,567.8	3,588.5	2,253.5	1,690.9	1,170.7	750.1	443.7	342.4	481.8	64.7
Middle Atlantic	1977	7,605.9	1,390.6	1,609.8	1,309.0	1,091.2	800.6	566.2	326.5	229.5	243.7	38.8
	1970	6,941.6	1,324.6	1,484.6	1,181.2	982.9	707.4	503.8	291.8	207.9	222.2	35.2
	1962	6,346.0	1,217.6	1,340.3	1,067.6	895.3	629.5	475.0	281.2	200.4	211.7	27.4
	1952	5,673.0	1,059.9	1,145.9	893.0	806.7	620.4	440.3	276.8	184.6	219.9	25.5
Lake States	1977	11,900.7	2,974.0	2,862.7	1,977.5	1,279.3	873.1	658.7	470.0	306.6	446.2	52.6
	1970	10,346.2	2,730.5	2,470.9	1,642.5	1,095.8	737.1	561.8	400.8	268.7	387.8	50.3
	1962	9,134.1	2,512.5	2,096.2	1,394.9	1,009.6	647.9	490.9	352.3	241.1	338.9	49.8
	1952	6,631.0	1,723.1	1,492.9	1,046.2	821.0	492.8	341.3	252.3	154.9	267.6	38.9
Central States	1977	1,684.2	273.6	359.0	383.6	309.8	165.2	96.8	41.4	22.4	23.7	8.7
	1970	1,438.4	241.3	315.0	330.8	255.2	134.3	76.5	34.4	19.2	22.5	9.2
	1962	1,167.9	192.6	259.2	253.7	183.3	118.8	64.8	36.4	18.1	29.8	11.2
	1952	971.3	153.2	210.0	229.1	140.9	96.5	52.6	36.9	19.7	27.8	4.6
Total, North	1977	44,574.1	10,886.5	10,476.3	7,792.4	5,466.2	3,585.1	2,466.0	1,528.9	936.0	1,237.2	199.5
	1970	39,661.3	9,889.7	9,431.1	6,875.1	4,810.9	3,168.7	2,118.9	1,304.0	828.2	1,079.2	155.5
	1962	34,331.8	8,751.2	8,068.1	5,709.8	4,075.3	2,744.9	1,859.7	1,154.9	775.9	1,045.9	146.1
	1952	27,629.4	6,504.0	6,437.3	4,421.8	3,459.5	2,380.4	1,584.3	1,009.7	701.6	997.1	133.7
South Atlantic	1977	23,333.0	2,781.9	3,972.8	4,310.6	3,852.0	3,120.3	2,196.7	1,289.9	781.5	903.7	123.6
	1970	21,299.1	2,611.7	3,732.7	3,983.0	3,544.7	2,802.7	1,906.5	1,177.1	681.8	755.3	103.6
	1962	19,209.8	2,431.6	3,498.4	3,666.9	3,251.4	2,411.7	1,638.1	1,026.6	566.3	631.4	87.4
	1952	18,406.6	2,334.0	3,404.6	3,503.7	3,173.4	2,248.1	1,513.1	929.2	538.1	667.3	95.1
East Gulf	1977	24,405.0	3,703.1	4,809.2	4,842.9	4,135.7	2,932.4	1,862.1	1,049.8	536.1	488.2	45.5
	1970	21,026.3	3,249.9	4,060.7	4,240.0	3,835.3	2,618.4	1,482.1	783.8	377.3	346.2	32.6
	1962	17,728.5	2,592.0	3,535.3	3,895.1	3,397.2	2,072.2	1,095.0	574.4	297.4	246.8	23.1
	1952	15,417.5	1,992.9	3,042.6	3,607.6	3,081.1	1,809.4	913.3	464.2	228.0	254.6	23.8
Central Gulf	1977	23,555.4	2,804.6	4,177.9	4,417.5	4,017.6	3,010.4	2,146.5	1,363.7	760.2	786.1	70.9
	1970	19,725.7	2,539.8	3,515.8	3,618.8	3,309.9	2,585.8	1,787.7	1,129.4	594.7	591.1	52.7
	1962	15,422.7	2,052.6	2,753.9	2,869.1	2,618.0	1,974.8	1,381.3	821.8	469.1	456.6	25.5
	1952	10,776.2	1,257.9	1,875.2	2,121.1	1,856.1	1,400.9	938.3	584.5	322.6	359.9	59.7
West Gulf	1977	25,842.9	2,254.9	3,384.1	4,172.2	4,271.2	3,819.7	2,919.5	2,023.1	1,309.7	1,534.9	153.6
	1970	22,845.0	2,003.0	3,025.6	3,687.1	3,790.4	3,372.4	2,580.0	1,823.5	1,146.1	1,283.5	133.4
	1962	19,191.9	1,766.7	2,591.7	3,067.7	3,144.9	2,769.5	2,264.3	1,548.8	954.2	988.6	95.5
	1952	13,645.0	1,273.9	1,865.0	2,341.1	2,398.0	2,009.0	1,578.6	1,037.5	552.3	529.4	60.2
Total, South	1977	97,136.3	11,544.5	16,344.0	17,743.2	16,276.5	12,882.8	9,124.8	5,726.5	3,387.5	3,712.9	393.6
	1970	84,896.1	10,404.4	14,334.8	15,528.9	14,480.3	11,379.3	7,756.3	4,913.8	2,799.9	2,976.1	322.3
	1962	71,552.9	8,842.9	12,379.3	13,498.8	12,411.5	9,228.2	6,378.7	3,971.6	2,287.0	2,323.4	231.5
	1952	58,245.3	6,858.7	10,187.4	11,573.5	10,508.6	7,467.4	4,943.3	3,015.4	1,641.0	1,811.2	238.8
Douglas-fir subregion (Western Oregon and western Washington)	1977	93,685.0	2,517.0	3,694.0	4,565.0	5,295.0	5,503.0	5,664.0	5,714.0	5,379.0	18,720.0	36,634.0
	1970	99,159.0	2,479.0	3,645.0	4,655.0	5,281.0	5,722.0	5,917.0	5,840.0	5,567.0	19,716.0	40,337.0
	1962	104,410.0	2,205.0	3,345.0	4,264.0	5,049.0	5,368.0	5,674.0	5,659.0	5,571.0	19,966.0	47,309.0
	1952	109,904.0	2,011.0	2,858.0	3,718.0	4,647.0	4,618.0	5,416.0	5,237.0	5,507.0	20,438.0	55,454.0
Pine subregion (Eastern Oregon and eastern Washington)	1977	38,850.0	3,304.0	3,541.0	3,670.0	3,505.0	3,216.0	3,018.0	2,779.0	2,480.0	7,579.0	5,758.0
	1970	41,157.0	3,018.0	3,615.0	3,750.0	3,639.0	3,387.0	3,168.0	2,955.0	2,616.0	8,233.0	6,776.0
	1962	40,584.0	2,749.0	3,228.0	3,282.0	3,214.0	3,037.0	2,934.0	2,823.0	2,538.0	8,698.0	8,081.0
	1952	39,670.0	2,253.0	2,735.0	2,648.0	2,723.0	2,624.0	2,674.0	2,607.0	2,460.0	9,069.0	9,877.0
Coastal Alaska	1977	38,188.9	606.9	861.3	1,324.0	1,886.3	2,283.5	2,635.4	2,843.6	3,007.9	10,802.4	11,937.6
	1970	40,373.0	624.0	899.4	1,373.4	1,975.9	2,384.8	2,767.2	2,990.0	3,160.8	11,366.4	12,831.1
	1962	41,038.9	615.3	909.7	1,374.6	1,995.4	2,400.2	2,801.9	3,028.2	3,196.2	11,495.1	13,222.3
	1952	41,599.4	591.4	920.3	1,366.5	2,007.0	2,400.5	2,828.5	3,055.7	3,216.5	11,578.4	13,634.6
Interior Alaska	1977	2,431.0	224.4	402.2	540.6	449.9	359.0	225.8	115.2	59.0	45.4	9.5
	1970	2,431.0	224.4	402.2	540.6	449.9	359.0	225.8	115.2	59.0	45.4	9.5
	1962	2,431.0	224.4	402.2	540.6	449.9	359.0	225.8	115.2	59.0	45.4	9.5
	1952	2,431.0	224.4	402.2	540.6	449.9	359.0	225.8	115.2	59.0	45.4	9.5
Total, Pacific Northwest	1977	173,154.9	6,652.3	8,498.5	10,099.6	11,136.2	11,361.5	11,543.2	11,451.8	10,925.9	37,146.8	54,339.1
	1970	183,120.0	6,345.4	8,561.6	10,319.0	11,345.8	11,852.8	12,078.0	11,900.2	11,402.8	39,360.8	59,953.6
	1962	188,463.9	5,793.7	7,884.9	9,461.2	10,708.3	11,164.2	11,635.7	11,625.4	11,364.2	40,204.5	68,621.8
	1952	193,604.4	5,079.8	6,915.5	8,273.1	9,826.9	10,001.5	11,144.3	11,014.9	11,242.5	41,130.8	78,975.1

Table 3.19—*Net volume of softwood growing stock on commercial timberland in the United States, by diameter class, section, and region, 1952, 1962, 1970, and 1977—Cont'd.*

[Million cubic feet]

Section and region	Year	Total	Diameter class (inches) 5.0 to 6.9	7.0 to 8.9	9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0+
Pacific Southwest	1977	45,979.0	769.0	1,259.0	1,613.0	1,885.0	2,213.0	2,387.0	2,456.0	2,511.0	10,016.0	20,870.0
	1970	47,700.0	836.0	1,375.0	1,757.0	2,050.0	2,300.0	2,426.0	2,461.0	2,531.0	9,834.0	22,130.0
	1962	53,369.0	925.0	1,472.0	1,810.0	2,029.0	2,171.0	2,260.0	2,313.0	2,342.0	10,020.0	28,027.0
	1952	58,009.8	766.1	1,245.1	1,603.2	1,835.3	2,055.4	2,159.5	2,268.7	2,281.7	10,140.6	33,654.2
Total, Pacific Coast	1977	219,133.9	7,421.3	9,757.5	11,712.6	13,021.2	13,574.5	13,930.2	13,907.8	13,436.9	47,162.8	75,209.1
	1970	230,820.0	7,181.4	9,936.6	12,076.0	13,395.8	14,152.8	14,504.0	14,361.2	13,933.8	49,194.8	82,083.6
	1962	241,832.9	6,718.7	9,356.9	11,271.2	12,737.3	13,335.2	13,895.7	13,938.4	13,706.2	50,224.5	96,648.8
	1952	251,614.2	5,845.9	8,160.6	9,876.3	11,662.2	12,056.9	13,303.8	13,283.6	13,524.2	51,271.4	112,629.3
Northern Rocky Mtn	1977	67,941.7	6,638.1	9,241.9	9,279.4	8,271.9	7,140.2	5,715.0	4,695.8	3,827.5	8,789.6	4,342.3
	1970	67,875.2	6,608.8	8,804.8	8,951.1	7,986.5	7,070.8	5,668.1	4,772.9	3,899.7	9,207.7	4,904.8
	1962	66,931.1	7,842.9	7,864.6	8,118.1	7,648.8	6,923.0	6,036.9	5,029.7	4,138.2	9,674.1	3,654.8
	1952	62,525.6	6,521.6	6,708.4	7,076.7	6,791.9	6,270.1	5,563.9	4,754.5	3,988.1	9,838.4	5,012.0
Southern Rocky Mtn	1977	26,993.1	2,877.4	2,770.5	2,894.3	2,957.7	2,775.3	2,632.3	2,336.1	1,928.4	4,583.2	1,237.9
	1970	26,537.6	2,842.4	2,656.9	2,762.4	2,804.3	2,695.6	2,618.4	2,339.6	1,939.3	4,550.2	1,328.5
	1962	26,173.0	2,528.0	2,252.8	2,399.4	2,689.7	2,691.1	2,641.9	2,353.9	2,018.6	4,924.3	1,673.3
	1952	24,931.2	2,108.1	1,861.8	2,036.9	2,356.2	2,437.5	2,463.4	2,260.8	2,006.1	5,226.1	2,174.3
Total, Rocky Mtn	1977	94,934.8	9,515.5	12,012.4	12,173.7	11,229.6	9,915.5	8,347.3	7,031.9	5,755.9	13,372.8	5,580.2
	1970	94,412.8	9,451.2	11,461.7	11,713.5	10,790.8	9,766.4	8,286.5	7,112.5	5,839.0	13,757.9	6,233.3
	1962	93,104.1	10,370.9	10,117.4	10,517.5	10,338.5	9,614.1	8,678.8	7,383.6	6,156.8	14,598.4	5,328.1
	1952	87,456.8	8,629.7	8,570.2	9,113.6	9,148.1	8,707.6	8,027.3	7,015.3	5,994.2	15,064.5	7,186.3
Total, all regions	1977	455,779.1	39,367.8	48,590.2	49,421.9	45,993.5	39,957.9	33,868.3	28,195.1	23,516.3	65,485.7	81,382.4
	1970	449,790.2	36,926.7	45,164.2	46,193.5	43,477.8	38,467.2	32,665.7	27,691.5	23,400.9	67,008.0	88,794.7
	1962	440,821.7	34,683.7	39,921.7	40,997.3	39,562.6	34,922.4	30,812.9	26,448.5	22,925.9	68,192.2	102,354.5
	1952	424,945.7	27,838.3	33,355.5	34,985.2	34,778.4	30,612.3	27,858.7	24,324.0	21,861.0	69,144.2	120,188.1

Table 3.20—*Net volume of hardwood growing stock on commercial timberland in the United States, by diameter class, section, and region, 1952, 1962, 1970, and 1977*

[Million cubic feet]

Section and region	Year	Total	Diameter class (inches) 5.0 to 6.9	7.0 to 8.9	9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0+
New England	1977	18,464.3	3,455.5	3,712.4	3,400.7	2,750.9	1,975.6	1,224.9	766.7	473.1	627.2	77.3
	1970	16,769.9	3,196.0	3,397.0	3,131.1	2,400.3	1,739.3	1,134.1	722.6	443.9	542.3	63.3
	1962	14,357.2	2,799.5	3,149.9	2,718.8	1,883.9	1,381.5	903.8	615.0	373.5	491.4	39.9
	1952	11,894.9	2,257.8	2,504.6	2,188.9	1,461.0	1,140.8	842.0	584.5	349.9	529.0	36.4
Middle Atlantic	1977	48,855.5	7,032.3	8,507.4	8,874.4	7,121.1	5,814.6	4,233.5	2,791.7	1,766.9	2,340.3	373.3
	1970	43,501.6	6,299.6	7,566.2	7,828.8	6,264.9	5,145.2	3,775.0	2,514.4	1,596.5	2,165.1	345.9
	1962	38,475.5	5,764.1	6,611.8	6,683.1	5,467.2	4,412.3	3,251.0	2,251.0	1,513.1	2,163.1	358.8
	1952	31,302.9	4,667.8	5,198.5	5,142.6	4,251.2	3,511.1	2,735.9	1,947.8	1,309.9	2,179.7	358.4
Lake States	1977	32,616.0	5,771.2	6,987.0	6,330.3	4,588.9	3,341.4	2,187.6	1,346.0	816.0	1,081.5	166.1
	1970	28,804.5	5,269.7	6,265.8	5,533.9	3,963.4	2,887.1	1,877.3	1,156.6	718.1	990.4	142.2
	1962	24,779.1	5,043.1	5,644.6	4,654.9	3,106.2	2,173.3	1,527.1	958.6	620.7	938.8	111.8
	1952	18,605.3	3,381.6	3,847.8	3,782.1	2,318.8	1,854.1	1,208.7	816.3	492.0	818.7	85.2
Central States	1977	28,635.0	3,176.3	3,859.8	4,408.9	4,164.0	3,832.2	3,065.3	2,138.5	1,373.7	2,157.6	458.7
	1970	27,124.6	2,869.9	3,617.2	4,164.4	3,952.9	3,617.1	2,890.0	2,026.9	1,336.2	2,179.1	470.9
	1962	25,458.3	2,405.8	3,393.4	3,907.5	3,812.9	3,353.2	2,619.6	1,851.0	1,281.8	2,325.2	507.9
	1952	21,842.2	2,004.5	2,972.2	3,279.8	3,042.6	2,691.4	2,247.5	1,672.8	1,197.3	2,312.1	422.0
Total, North	1977	128,570.8	19,435.3	23,066.6	23,014.3	18,624.9	14,963.8	10,711.3	7,042.9	4,429.7	6,206.6	1,075.4
	1970	116,200.6	17,635.2	20,846.2	20,658.2	16,581.5	13,388.7	9,676.4	6,420.5	4,094.7	5,876.9	1,022.3
	1962	103,070.1	16,012.5	18,799.7	17,964.3	14,270.2	11,320.3	8,301.5	5,675.6	3,789.1	5,918.5	1,018.4
	1952	83,645.3	12,311.7	14,523.1	14,393.4	11,073.6	9,197.4	7,034.1	5,021.4	3,349.1	5,839.5	902.0
South Atlantic	1977	36,654.8	3,307.1	4,612.8	5,406.3	5,552.7	5,139.7	4,124.2	3,003.0	1,925.4	2,993.1	590.5
	1970	32,070.2	2,972.8	4,072.0	4,739.2	4,895.7	4,502.1	3,530.0	2,590.0	1,646.3	2,609.4	512.7
	1962	28,376.7	2,640.3	3,634.3	4,238.1	4,331.9	3,991.3	3,059.8	2,258.2	1,468.7	2,303.6	450.5
	1952	25,913.5	2,108.9	3,197.2	3,858.6	3,907.6	3,705.3	2,787.0	2,169.4	1,452.6	2,261.3	465.6
East Gulf	1977	15,729.4	1,875.7	2,324.2	2,528.0	2,421.2	2,064.0	1,486.3	980.6	651.1	1,121.1	277.2
	1970	14,149.1	1,500.7	1,967.8	2,261.6	2,232.9	1,933.6	1,375.8	948.4	642.9	1,030.5	254.9
	1962	12,477.6	1,334.5	1,746.3	2,032.6	2,013.8	1,724.4	1,154.3	829.9	581.2	896.6	164.0
	1952	11,708.2	1,114.3	1,529.7	1,930.4	1,812.3	1,638.4	1,116.3	814.0	563.1	1,002.9	186.8
Central Gulf	1977	28,422.0	3,446.7	4,364.1	4,791.3	4,286.3	3,745.3	2,892.5	1,903.8	1,147.9	1,568.8	275.3
	1970	23,986.1	2,993.3	3,812.1	4,195.5	3,678.8	3,127.1	2,358.5	1,431.2	892.1	1,294.7	202.8
	1962	21,881.7	2,648.5	3,472.4	3,920.7	3,359.7	2,817.0	1,957.1	1,328.4	878.6	1,286.3	213.0
	1952	19,871.2	2,057.7	2,887.1	3,342.3	3,049.5	2,660.2	1,960.7	1,392.5	912.1	1,394.1	215.0
West Gulf	1977	24,066.8	3,032.4	3,569.6	3,731.4	3,249.0	3,026.0	2,437.3	1,725.8	1,173.7	1,798.6	323.0
	1970	21,717.7	2,502.2	3,119.9	3,363.8	3,028.6	2,854.5	2,251.2	1,579.7	1,087.3	1,654.7	275.8
	1962	21,749.3	2,388.5	2,977.2	3,327.3	3,132.8	2,879.8	2,283.6	1,626.6	1,138.3	1,719.4	275.8
	1952	20,745.4	1,941.6	2,517.0	3,078.0	3,080.8	2,849.6	2,301.2	1,696.7	1,150.2	1,812.7	317.6
Total, South	1977	104,873.0	11,661.9	14,870.7	16,457.0	15,509.2	13,975.0	10,940.3	7,613.2	4,898.1	7,481.6	1,466.0
	1970	91,923.1	9,969.0	12,971.8	14,560.1	13,836.0	12,417.3	9,515.5	6,549.3	4,268.6	6,589.3	1,246.2
	1962	84,485.3	9,011.8	11,830.2	13,518.7	12,838.2	11,412.5	8,454.8	6,043.1	4,066.8	6,205.9	1,103.3
	1952	78,238.3	7,222.5	10,131.0	12,209.3	11,850.2	10,853.5	8,165.2	6,072.6	4,078.0	6,471.0	1,185.0
Douglas-fir subregion (Western Oregon and western Washington)	1977	10,326.0	1,174.0	1,447.0	1,569.0	1,495.0	1,279.0	956.0	748.0	501.0	900.0	257.0
	1970	10,981.0	1,539.0	1,549.0	1,525.0	1,405.0	1,249.0	976.0	758.0	547.0	1,105.0	328.0
	1962	9,063.0	1,270.0	1,296.0	1,294.0	1,202.0	1,059.0	777.0	604.0	434.0	894.0	233.0
	1952	6,908.0	999.0	1,026.0	1,026.0	938.0	800.0	526.0	449.0	314.0	648.0	182.0
Pine subregion (Eastern Oregon and eastern Washington)	1977	196.0	25.0	28.0	25.0	25.0	20.0	15.0	14.0	10.0	24.0	10.0
	1970	198.0	32.0	42.0	29.0	29.0	12.0	5.0	11.0	8.0	25.0	5.0
	1962	184.0	29.0	38.0	27.0	28.0	12.0	5.0	10.0	7.0	23.0	5.0
	1952	174.0	38.0	36.0	23.0	23.0	7.0	3.0	9.0	7.0	23.0	5.0
Coastal Alaska	1977	384.6	34.3	24.0	43.0	36.9	54.1	37.9	38.6	15.0	41.1	59.7
	1970	393.7	35.1	24.6	44.0	37.8	55.4	38.8	39.5	15.4	42.0	61.1
	1962	395.2	35.3	24.7	44.2	37.9	55.6	39.0	39.6	15.4	42.2	61.3
	1952	395.0	35.2	24.7	44.2	37.9	55.6	39.0	39.6	15.4	42.1	61.3
Interior Alaska	1977	2,068.2	401.2	459.4	385.4	262.8	183.1	87.2	46.5	58.7	124.5	59.4
	1970	2,068.2	401.2	459.4	385.4	262.8	183.1	87.2	46.5	58.7	124.5	59.4
	1962	2,068.2	401.2	459.4	385.4	262.8	183.1	87.2	46.5	58.7	124.5	59.4
	1952	2,068.2	401.2	459.4	385.4	262.8	183.1	87.2	46.5	58.7	124.5	59.4
Total, Pacific Northwest	1977	12,974.8	1,634.5	1,958.4	2,022.4	1,819.7	1,536.2	1,096.1	847.1	584.7	1,089.6	386.1
	1970	13,640.9	2,007.3	2,075.0	1,983.4	1,734.6	1,499.5	1,107.0	855.0	629.1	1,296.5	453.5
	1962	11,710.4	1,735.5	1,818.1	1,750.6	1,530.7	1,309.7	908.2	700.1	515.1	1,083.7	358.7
	1952	9,545.2	1,473.4	1,546.1	1,478.6	1,261.7	1,045.7	655.2	544.1	395.1	837.6	307.7

Table 3.20—*Net volume of hardwood growing stock on commercial timberland in the United States, by diameter class, section, and region, 1952, 1962, 1970, and 1977—Cont'd.*

[Million cubic feet]

Section and region	Year	Total	Diameter class (inches) 5.0 to 6.9	7.0 to 8.9	9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0+
Pacific Southwest	1977	3,891.0	254.0	411.0	415.0	391.0	368.0	365.0	299.0	266.0	720.0	402.0
	1970	3,995.0	256.0	389.0	406.0	407.0	418.0	364.0	341.0	276.0	730.0	408.0
	1962	3,194.0	201.0	314.0	296.0	301.0	328.0	277.0	266.0	217.0	567.0	427.0
	1952	3,047.3	192.9	319.5	249.6	281.0	300.7	257.0	241.6	203.0	536.0	466.0
Total, Pacific Coast	1977	16,865.8	1,888.5	2,369.4	2,437.4	2,210.7	1,904.2	1,461.1	1,146.1	850.7	1,809.6	788.1
	1970	17,635.9	2,263.3	2,464.0	2,389.4	2,141.6	1,917.5	1,471.0	1,196.0	905.1	2,026.5	861.5
	1962	14,904.4	1,936.5	2,132.1	2,046.6	1,831.7	1,637.7	1,185.2	966.1	732.1	1,650.7	785.7
	1952	12,592.5	1,666.3	1,865.6	1,728.2	1,542.7	1,346.4	912.2	785.7	598.1	1,373.6	773.7
Northern Rocky Mtn	1977	756.8	130.2	130.3	114.9	93.5	73.0	52.8	41.1	28.1	77.8	15.1
	1970	747.6	123.7	123.4	112.7	94.4	71.7	54.5	42.0	29.3	80.3	15.6
	1962	716.9	108.6	113.7	102.2	92.3	69.7	52.1	41.9	30.6	89.5	16.3
	1952	652.9	89.5	96.6	89.3	81.9	63.2	48.0	39.8	29.2	89.9	25.5
Southern Rocky Mtn	1977	4,122.4	673.6	1,037.3	894.5	645.5	389.6	225.0	134.1	67.0	55.7	.1
	1970	4,129.6	662.1	1,028.4	872.6	648.9	407.6	233.2	145.2	73.6	57.7	.3
	1962	3,784.7	444.8	836.3	839.6	649.1	440.0	267.0	155.4	85.7	66.7	.1
	1952	3,325.5	355.9	705.7	728.7	579.1	404.2	250.1	148.4	84.5	68.8	.1
Total, Rocky Mtn	1977	4,879.2	803.8	1,167.6	1,009.4	739.0	462.6	277.8	175.2	95.1	133.5	15.2
	1970	4,877.2	785.8	1,151.8	985.3	743.3	479.3	287.7	187.2	102.9	138.0	15.9
	1962	4,501.6	553.4	950.0	941.8	741.4	509.7	319.1	197.3	116.3	156.2	16.4
	1952	3,978.4	445.4	802.3	818.0	661.0	467.4	298.1	188.2	113.7	158.7	25.6
Total, all regions	1977	255,188.8	33,789.5	41,474.3	42,918.1	37,083.8	31,305.6	23,390.5	15,977.4	10,273.6	15,631.3	3,344.7
	1970	230,636.8	30,653.3	37,433.8	38,593.0	33,302.4	28,202.8	20,950.6	14,353.0	9,371.3	14,630.7	3,145.9
	1962	206,961.4	27,514.2	33,712.0	34,471.4	29,681.5	24,880.2	18,260.6	12,882.1	8,704.3	13,931.3	2,923.8
	1952	178,454.5	21,645.9	27,322.0	29,148.9	25,127.5	21,864.7	16,409.6	12,067.9	8,138.9	13,842.8	2,886.3

Table 3.21—*Net volume of softwood sawtimber on commercial timberland in the United States, by diameter class, section, and region, 1952, 1962, 1970, and 1977*

[Million board feet, International 1/4-inch log rule]

Section and region	Year	Total	Diameter class (inches)							
			9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0+
New England	1977	43,799.6	13,743.3	10,515.6	7,083.9	4,879.6	3,041.7	1,704.5	2,377.4	453.6
	1970	38,445.5	12,527.6	9,292.5	6,268.3	4,095.4	2,495.2	1,483.2	2,003.1	280.2
	1962	31,828.0	9,936.1	7,374.0	5,269.1	3,440.7	2,088.9	1,399.5	2,071.7	248.0
	1952	27,475.0	7,644.0	6,334.0	4,575.0	3,110.0	1,873.0	1,516.0	2,145.0	278.0
Middle Atlantic	1977	17,094.4	4,324.3	3,840.1	3,001.8	2,223.1	1,349.4	1,024.6	1,156.0	175.1
	1970	15,348.2	3,902.5	3,451.7	2,651.5	1,976.8	1,208.5	930.6	1,062.2	164.4
	1962	14,130.0	3,620.8	3,111.4	2,349.4	1,848.3	1,159.8	889.9	1,012.3	138.1
	1952	13,109.0	3,032.0	2,820.0	2,322.0	1,746.0	1,163.0	836.0	1,059.0	131.0
Lake States	1977	30,984.3	9,088.9	6,165.3	4,492.9	3,615.0	2,709.0	1,814.2	2,762.0	337.0
	1970	25,178.1	7,166.7	4,999.4	3,626.3	2,960.5	2,229.5	1,548.0	2,340.4	307.3
	1962	20,761.9	5,618.3	4,259.8	2,983.9	2,441.6	1,860.1	1,340.6	1,978.9	278.7
	1952	15,179.0	4,085.6	3,363.3	2,197.9	1,621.8	1,275.3	816.7	1,615.6	202.8
Central States	1977	4,625.2	1,530.2	1,369.3	769.2	457.3	208.8	115.3	124.7	50.4
	1970	3,905.2	1,340.2	1,131.8	623.1	361.3	176.9	98.6	119.3	54.0
	1962	3,156.8	1,078.8	803.9	529.0	284.9	167.0	88.4	146.2	58.6
	1952	2,993.3	984.7	701.4	528.1	274.5	207.0	108.1	164.9	24.6
Total, North	1977	96,503.5	28,686.7	21,890.3	15,347.8	11,175.0	7,308.9	4,658.6	6,420.1	1,016.1
	1970	82,877.0	24,937.0	18,875.4	13,169.2	9,394.0	6,110.1	4,060.4	5,525.0	805.9
	1962	69,876.7	20,254.0	15,549.1	11,131.4	8,015.5	5,275.8	3,718.4	5,209.1	723.4
	1952	58,756.3	15,746.3	13,218.7	9,623.0	6,752.3	4,518.3	3,276.8	4,984.5	636.4
South Atlantic	1977	74,317.3	15,222.5	16,401.4	14,737.0	11,143.9	6,869.4	4,214.4	5,017.9	710.8
	1970	66,973.7	14,089.4	15,117.2	13,284.2	9,692.2	6,286.3	3,687.7	4,217.0	599.7
	1962	59,544.0	13,008.3	13,932.4	11,516.1	8,373.2	5,506.4	3,101.7	3,588.5	517.4
	1952	56,007.1	12,425.6	13,566.1	10,578.2	7,555.6	4,833.6	2,853.2	3,655.2	539.6
East Gulf	1977	74,078.1	18,016.2	18,874.4	14,961.9	10,300.7	5,830.8	3,020.7	2,809.5	263.9
	1970	63,566.8	15,818.3	17,523.3	13,367.8	8,202.7	4,352.1	2,124.0	1,990.2	188.4
	1962	53,200.1	14,592.5	15,568.0	10,585.7	6,061.4	3,183.5	1,666.8	1,408.6	133.6
	1952	47,303.5	13,528.5	14,094.6	9,237.5	5,024.5	2,567.6	1,271.9	1,442.6	136.3
Central Gulf	1977	87,903.2	19,261.7	20,860.8	16,200.0	12,820.1	8,437.9	4,808.7	5,078.1	435.9
	1970	72,840.3	15,430.8	17,205.6	14,032.7	10,870.6	7,140.8	3,858.3	3,965.2	336.3
	1962	56,560.0	12,296.0	13,666.0	10,706.0	8,416.0	5,201.0	3,052.0	3,071.0	152.0
	1952	38,517.4	8,579.1	9,151.0	7,561.0	5,312.7	3,419.4	1,928.8	2,204.6	360.8
West Gulf	1977	104,723.9	16,788.6	21,070.9	20,701.8	16,433.2	11,785.1	7,744.0	9,260.9	939.4
	1970	92,423.6	14,841.5	18,758.3	18,234.1	14,559.9	10,657.5	6,795.7	7,760.8	815.8
	1962	76,408.0	12,151.0	15,479.0	14,876.0	12,720.0	8,987.0	5,638.0	5,967.0	590.0
	1952	54,728.0	9,418.0	11,989.0	11,024.0	9,131.0	6,144.0	3,350.0	3,294.0	378.0
Total, South	1977	341,022.5	69,289.0	77,207.5	66,600.7	50,697.9	32,923.2	19,787.8	22,166.4	2,350.0
	1970	295,804.4	60,180.0	68,604.4	58,918.8	43,325.4	28,436.7	16,465.7	17,933.2	1,940.2
	1962	245,712.1	52,047.8	58,645.4	47,683.8	35,570.6	22,877.9	13,458.5	14,035.1	1,393.0
	1952	196,556.0	43,951.2	48,800.7	38,400.7	27,023.8	16,964.6	9,403.9	10,596.4	1,414.7
Douglas-fir subregion (Western Oregon and western Washington)	1977	546,054.0	19,314.0	25,054.0	28,898.0	31,955.0	33,631.0	32,705.0	120,217.0	254,280.0
	1970	582,565.0	20,224.0	24,156.0	29,193.0	32,652.0	34,052.0	33,825.0	127,948.0	280,515.0
	1962	629,785.0	22,078.0	22,676.0	27,391.0	31,320.0	32,981.0	33,822.0	131,732.0	327,785.0
	1952	683,727.0	24,773.0	21,028.0	23,617.0	29,907.0	30,617.0	33,441.0	134,786.0	385,558.0
Pine subregion (Eastern Oregon and eastern Washington)	1977	181,432.0	15,967.0	16,501.0	16,229.0	16,186.0	15,681.0	14,525.0	47,388.0	38,955.0
	1970	195,453.0	15,717.0	16,529.0	16,886.0	16,937.0	16,583.0	15,283.0	51,473.0	46,045.0
	1962	200,527.0	16,040.0	14,575.0	15,107.0	15,605.0	15,771.0	14,803.0	49,998.0	58,628.0
	1952	207,960.0	16,801.0	12,312.0	12,970.0	14,195.0	14,565.0	14,310.0	53,900.0	68,907.0
Coastal Alaska	1977	174,604.0	4,670.0	7,305.0	9,586.0	11,661.0	13,050.0	14,195.0	52,759.0	61,378.0
	1970	184,688.0	4,840.0	7,640.0	9,997.0	12,226.0	13,699.0	14,895.0	55,436.0	65,955.0
	1962	187,967.0	4,847.0	7,717.0	10,063.0	12,376.0	13,870.0	15,055.0	56,046.0	67,993.0
	1952	190,794.0	4,820.0	7,760.0	10,060.0	12,482.0	13,983.0	15,135.0	56,403.0	70,151.0
Interior Alaska	1977	9,801.8	2,841.8	2,415.3	1,985.5	1,246.6	650.8	335.0	290.0	36.8
	1970	9,801.8	2,841.8	2,415.3	1,985.5	1,246.6	650.8	335.0	290.0	36.8
	1962	9,801.8	2,841.8	2,415.3	1,985.5	1,246.6	650.8	335.0	290.0	36.8
	1952	9,801.8	2,841.8	2,415.3	1,985.5	1,246.6	650.8	335.0	290.0	36.8
Total, Pacific Northwest	1977	911,891.8	42,792.8	51,275.3	56,698.5	61,048.6	63,012.8	61,760.0	220,654.0	354,649.8
	1970	972,507.8	43,622.8	50,740.3	58,061.5	63,061.6	64,984.8	64,338.0	235,147.0	392,551.8
	1962	1,028,080.8	45,806.8	47,383.3	54,546.5	60,547.6	63,272.8	64,015.0	238,066.0	454,442.8
	1952	1,092,282.8	49,235.8	43,515.3	48,632.5	57,830.6	59,815.8	63,221.0	245,379.0	524,652.8

Table 3.21—*Net volume of softwood sawtimber on commercial timberland in the United States, by diameter class, section, and region, 1952, 1962, 1970, and 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section and region	Year	Total	Diameter class (inches) 9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0+
Pacific Southwest	1977	255,611.0	4,975.0	7,199.0	10,030.0	11,616.0	12,710.0	13,696.0	57,931.0	137,454.0
	1970	267,098.0	5,099.0	7,446.0	10,116.0	11,003.0	12,648.0	13,671.0	58,249.0	148,866.0
	1962	299,263.0	5,803.0	5,498.0	8,298.0	9,962.0	10,773.0	11,970.0	57,523.0	189,436.0
	1952	337,813.3	6,652.0	5,105.9	7,795.7	9,423.7	10,416.4	11,750.2	59,674.6	226,994.8
Total, Pacific Coast	1977	1,167,502.8	47,767.8	58,474.3	66,728.5	72,664.6	75,722.8	75,456.0	278,585.0	492,103.8
	1970	1,239,605.8	48,721.8	58,186.3	68,177.5	74,064.6	77,632.8	78,009.0	293,396.0	541,417.8
	1962	1,327,343.8	51,609.8	52,881.3	62,844.5	70,509.6	74,045.8	75,985.0	295,589.0	643,878.8
	1952	1,430,096.1	55,887.8	48,621.2	56,428.2	67,254.3	70,232.2	74,971.2	305,053.6	751,647.6
Northern Rocky Mtn	1977	267,567.3	39,533.5	40,727.7	36,316.8	29,725.8	24,958.0	20,663.8	49,722.6	25,919.1
	1970	271,694.1	39,305.6	38,692.6	35,964.5	29,694.9	25,569.4	21,228.6	52,140.3	29,098.2
	1962	275,788.0	38,366.9	37,863.1	36,080.1	32,673.4	28,072.3	23,617.2	56,855.1	22,259.9
	1952	268,192.1	33,519.0	33,680.5	32,787.5	30,205.4	26,610.8	22,810.2	57,838.1	30,740.6
Southern Rocky Mtn	1977	112,812.2	14,043.6	14,067.0	14,072.9	13,783.1	12,580.6	10,593.2	26,159.1	7,512.7
	1970	111,691.9	13,624.4	13,387.1	13,729.2	13,744.8	12,618.9	10,657.4	25,954.9	7,975.2
	1962	114,037.0	13,245.0	12,056.0	13,141.0	13,635.0	12,681.0	11,228.0	28,075.0	9,976.0
	1952	112,603.0	11,361.0	10,602.0	11,918.0	12,708.0	12,161.0	11,142.0	29,757.0	12,954.0
Total, Rocky Mtn	1977	380,379.5	53,577.1	54,794.7	50,389.7	43,508.9	37,538.6	31,257.0	75,881.7	33,431.8
	1970	383,386.0	52,930.0	52,079.7	49,693.7	43,439.7	38,188.3	31,886.0	78,095.2	37,073.4
	1962	389,825.0	51,611.9	49,919.1	49,221.1	46,308.4	40,753.3	34,845.2	84,930.1	32,235.9
	1952	380,795.1	44,880.0	44,282.5	44,705.5	42,913.4	38,771.8	33,952.2	87,595.1	43,694.6
Total, all regions	1977	1,985,408.1	199,320.6	212,366.8	199,066.7	178,046.4	153,493.5	131,159.4	383,053.2	528,901.7
	1970	2,001,673.1	186,768.8	197,745.8	189,959.2	170,223.7	150,367.9	130,421.1	394,949.4	581,237.3
	1962	2,032,757.6	175,523.5	176,994.9	170,880.8	160,404.1	142,952.8	128,007.1	399,763.3	678,231.1
	1952	2,066,203.5	160,465.3	154,923.1	149,157.4	143,943.8	130,486.9	121,604.1	408,229.6	797,393.3

Table 3.22—*Net volume of hardwood sawtimber on commercial timberland in the United States, by diameter class, section, and region, 1952, 1962, 1970, and 1977*

[Million board feet, International 1/4-inch log rule]

Section and region	Year	Total	Diameter class (inches) 11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0+
New England	1977	31,707.2	9,900.5	7,824.2	5,161.4	3,354.8	2,160.1	2,945.9	360.3
	1970	28,710.8	8,723.0	6,966.7	4,843.0	3,212.7	2,062.1	2,604.1	299.2
	1962	24,493.0	7,034.5	5,900.2	4,070.9	2,915.9	1,857.1	2,530.1	184.3
	1952	20,600.0	5,153.0	4,645.0	3,633.0	2,661.0	1,716.0	2,616.0	176.0
Middle Atlantic	1977	84,865.0	22,346.0	19,872.6	15,136.2	10,332.7	6,702.4	9,028.1	1,447.0
	1970	75,831.9	19,688.1	17,594.3	13,494.8	9,296.5	6,061.6	8,357.0	1,339.6
	1962	68,358.0	17,093.5	15,139.8	11,707.1	8,467.9	5,878.7	8,577.9	1,493.1
	1952	63,422.0	14,327.0	13,055.0	10,810.0	8,083.0	5,674.0	9,788.0	1,685.0
Lake States	1977	66,781.8	22,311.2	16,431.2	10,871.6	6,817.3	4,070.2	5,472.0	808.3
	1970	55,533.0	18,210.8	13,590.2	9,000.4	5,688.7	3,493.5	4,910.0	639.4
	1962	45,997.0	14,652.4	10,522.6	7,542.0	4,853.0	3,126.7	4,750.9	549.4
	1952	34,009.2	9,773.5	8,196.8	5,454.2	3,853.0	2,335.1	3,917.2	479.4
Central States	1977	79,163.1	17,703.0	17,319.1	14,223.9	10,194.5	6,706.7	10,833.0	2,182.9
	1970	76,708.8	17,033.5	16,513.0	13,547.0	9,757.6	6,600.8	11,011.3	2,245.6
	1962	73,428.4	16,667.1	15,381.9	12,280.8	8,873.2	6,271.5	11,569.8	2,384.1
	1952	71,841.6	14,951.0	13,981.6	11,994.6	9,145.7	6,606.3	12,535.4	2,627.0
Total, North	1977	262,517.1	72,260.7	61,447.1	45,393.1	30,699.3	19,639.4	28,279.0	4,798.5
	1970	236,784.5	63,655.4	54,664.2	40,885.2	27,955.5	18,218.0	26,882.4	4,523.8
	1962	212,276.4	55,447.5	46,944.5	35,600.8	25,110.0	17,134.0	27,428.7	4,610.9
	1952	189,872.8	44,204.5	39,878.4	31,891.8	23,742.7	16,331.4	28,856.6	4,967.4
South Atlantic	1977	97,083.8	18,362.3	20,033.6	17,714.4	13,701.9	9,179.9	14,966.1	3,125.6
	1970	84,527.5	16,208.9	17,567.3	15,174.6	11,845.0	7,855.0	13,139.4	2,737.3
	1962	74,313.9	14,296.5	15,527.3	13,123.1	10,323.0	6,989.4	11,636.6	2,418.0
	1952	69,408.9	13,146.4	14,691.2	11,919.3	9,761.0	6,708.1	10,872.3	2,310.6
East Gulf	1977	38,400.3	8,164.8	8,396.8	6,859.5	4,812.0	3,267.2	5,545.9	1,354.1
	1970	35,994.5	7,538.7	7,873.7	6,341.8	4,661.2	3,230.9	5,102.1	1,246.1
	1962	31,370.2	6,795.6	7,026.9	5,300.4	4,083.7	2,928.2	4,429.7	805.7
	1952	30,608.5	6,089.7	6,657.8	5,132.8	4,025.9	2,836.1	4,951.2	915.0
Central Gulf	1977	74,447.8	17,098.1	17,116.9	14,177.2	9,765.4	6,064.8	8,611.6	1,613.8
	1970	59,004.8	14,319.3	13,890.5	11,214.6	7,087.3	4,537.5	6,852.2	1,103.4
	1962	53,955.0	13,112.0	12,535.0	9,309.0	6,565.0	4,464.0	6,813.0	1,157.0
	1952	53,176.1	11,948.4	11,882.3	9,350.8	6,883.5	4,628.6	7,326.7	1,155.8
West Gulf	1977	63,754.1	12,379.2	13,502.5	11,678.8	8,649.0	6,053.5	9,664.1	1,827.0
	1970	59,264.3	11,586.4	12,811.2	10,852.9	7,960.5	5,622.0	8,891.6	1,539.7
	1962	59,742.0	11,818.0	12,662.0	10,823.0	8,031.0	5,789.0	9,088.0	1,531.0
	1952	59,441.0	11,583.0	12,332.0	10,713.0	8,195.0	5,725.0	9,214.0	1,679.0
Total, South	1977	273,686.0	56,004.4	59,049.8	50,429.9	36,928.3	24,565.4	38,787.7	7,920.5
	1970	238,791.1	49,653.3	52,142.7	43,583.9	31,554.0	21,245.4	33,985.3	6,626.5
	1962	219,381.1	46,022.1	47,751.2	38,555.5	29,002.7	20,170.6	31,967.3	5,911.7
	1952	212,634.5	42,767.5	45,563.3	37,115.9	28,865.4	19,897.8	32,364.2	6,060.4
Douglas-fir subregion (Western Oregon and western Washington)	1977	33,502.0	6,643.0	6,433.0	5,243.0	4,361.0	3,034.0	5,960.0	1,828.0
	1970	37,873.0	6,414.0	6,419.0	5,574.0	4,750.0	3,636.0	8,222.0	2,858.0
	1962	31,037.0	5,490.0	5,469.0	4,477.0	3,823.0	2,923.0	6,274.0	2,581.0
	1952	23,318.0	4,317.0	4,171.0	3,112.0	2,881.0	2,141.0	4,645.0	2,051.0
Pine subregion (Eastern Oregon and eastern Washington)	1977	480.0	85.0	77.0	65.0	55.0	44.0	106.0	48.0
	1970	494.0	119.0	53.0	26.0	57.0	47.0	158.0	34.0
	1962	437.0	107.0	48.0	25.0	50.0	39.0	134.0	34.0
	1952	424.0	101.0	36.0	15.0	43.0	37.0	152.0	40.0
Coastal Alaska	1977	1,355.5	148.6	232.6	164.6	175.5	70.5	210.6	353.1
	1970	1,387.6	152.1	238.1	168.4	179.7	72.2	215.6	361.5
	1962	1,393.1	152.7	239.1	169.1	180.4	72.4	216.5	362.9
	1952	1,392.2	152.6	238.9	169.0	180.3	72.4	216.3	362.7
Interior Alaska	1977	3,096.2	867.5	653.9	333.7	185.8	243.8	545.3	266.2
	1970	3,096.2	867.5	653.9	333.7	185.8	243.8	545.3	266.2
	1962	3,096.2	867.5	653.9	333.7	185.8	243.8	545.3	266.2
	1952	3,096.2	867.5	653.9	333.7	185.8	243.8	545.3	266.2
Total, Pacific Northwest	1977	38,433.7	7,744.1	7,396.5	5,806.3	4,777.3	3,392.3	6,821.9	2,495.3
	1970	42,850.8	7,552.6	7,364.0	6,102.1	5,172.5	3,999.0	9,140.9	3,519.7
	1962	35,963.3	6,617.2	6,410.0	5,004.8	4,239.2	3,278.2	7,169.8	3,244.1
	1952	28,230.4	5,438.1	5,099.8	3,629.7	3,290.1	2,494.2	5,558.6	2,719.9

Table 3.22—*Net volume of hardwood sawtimber on commercial timberland in the United States, by diameter class, section, and region, 1952, 1962, 1970, and 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section and region	Year	Total	Diameter class (inches) 11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0+
Pacific Southwest	1977	9,105.0	977.0	1,050.0	1,102.0	938.0	970.0	2,564.0	1,504.0
	1970	8,316.0	829.0	981.0	979.0	946.0	876.0	2,252.0	1,453.0
	1962	6,447.0	575.0	740.0	709.0	719.0	641.0	1,677.0	1,386.0
	1952	6,297.0	533.1	679.6	660.0	667.2	606.7	1,608.0	1,542.4
Total, Pacific Coast	1977	47,538.7	8,721.1	8,446.5	6,908.3	5,715.3	4,362.3	9,385.9	3,999.3
	1970	51,166.8	8,381.6	8,345.0	7,081.1	6,118.5	4,875.0	11,392.9	4,972.7
	1962	42,410.3	7,192.2	7,150.0	5,713.8	4,958.2	3,919.2	8,846.8	4,630.1
	1952	34,527.4	5,971.2	5,779.4	4,289.7	3,957.3	3,100.9	7,166.6	4,262.3
Northern Rocky Mtn	1977	2,078.5	494.7	414.6	290.3	216.0	149.8	420.4	92.7
	1970	2,125.1	502.3	410.1	296.7	219.9	156.7	436.2	103.2
	1962	2,147.6	480.7	387.5	289.6	220.8	165.8	491.9	111.3
	1952	2,082.5	424.3	351.3	263.2	211.6	159.6	496.7	175.8
Southern Rocky Mtn	1977	7,711.3	3,171.0	1,970.1	1,181.6	726.4	371.8	290.2	.2
	1970	7,838.5	3,135.4	2,028.4	1,207.1	772.3	396.7	297.2	1.4
	1962	7,485.0	2,882.0	1,964.0	1,207.0	713.0	403.0	315.0	1.0
	1952	6,901.0	2,563.0	1,804.0	1,129.0	683.0	399.0	322.0	1.0
Total, Rocky Mtn	1977	9,789.8	3,665.7	2,384.7	1,471.9	942.4	521.6	710.6	92.9
	1970	9,963.6	3,637.7	2,438.5	1,503.8	992.2	553.4	733.4	104.6
	1962	9,632.6	3,362.7	2,351.5	1,496.6	933.8	568.8	806.9	112.3
	1952	8,983.5	2,987.3	2,155.3	1,392.2	894.6	558.6	818.7	176.8
Total, all regions	1977	593,531.5	140,651.9	131,328.1	104,203.2	74,285.3	49,088.7	77,163.2	16,811.2
	1970	536,705.9	125,328.0	117,590.4	93,054.0	66,620.2	44,891.8	72,994.0	16,227.6
	1962	483,700.4	112,024.5	104,197.2	81,366.7	60,004.7	41,792.6	69,049.7	15,265.0
	1952	446,018.2	95,930.5	93,376.4	74,689.6	57,460.0	39,888.7	69,206.1	15,466.9

Table 3.23—*Net volume of softwood growing stock on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977*

[Million cubic feet]

Section, region and diameter class	Total softwoods	Softwoods: Longleaf and slash pine	Loblolly and shortleaf pine	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
New England:											
5.0 to 6.9	6,248.3	.0	.0	14.4	654.7	.0	4,715.9	483.1	.0	380.2	.0
7.0 to 8.9	5,644.8	.0	.0	23.2	703.4	.0	4,005.4	473.6	.0	439.2	.0
9.0 to 10.9	4,122.3	.0	.0	24.2	691.9	.0	2,565.5	482.4	.0	358.3	.0
11.0 to 12.9	2,785.9	.0	.0	20.8	679.9	.0	1,372.7	460.1	.0	252.4	.0
13.0 to 14.9	1,746.2	.0	.0	14.4	583.9	.0	691.1	320.2	.0	136.6	.0
15.0 to 16.9	1,144.3	.0	.0	7.1	507.5	.0	346.7	221.0	.0	62.0	.0
17.0 to 18.9	691.0	.0	.0	4.9	362.7	.0	171.7	121.9	.0	29.8	.0
19.0 to 20.9	377.5	.0	.0	.0	235.4	.0	66.3	68.5	.0	7.3	.0
21.0 to 28.9	523.6	.0	.0	.0	389.6	.0	41.3	81.0	.0	11.7	.0
29.0+	99.4	.0	.0	.0	88.1	.0	1.4	7.8	.0	2.1	.0
Total	23,383.3	.0	.0	109.0	4,897.1	.0	13,978.0	2,719.6	.0	1,679.6	.0
Middle Atlantic:											
5.0 to 6.9	1,390.6	.0	45.2	161.1	412.2	.0	239.2	463.2	.0	69.7	.0
7.0 to 8.9	1,609.8	.0	89.9	325.2	490.4	.0	191.6	433.2	.0	79.5	.0
9.0 to 10.9	1,309.0	.0	127.1	301.0	322.6	.0	149.6	366.4	.0	42.3	.0
11.0 to 12.9	1,091.2	.0	128.8	243.7	249.0	.0	119.1	324.7	.0	25.9	.0
13.0 to 14.9	800.6	.0	127.0	131.7	208.0	.0	79.9	239.8	.0	14.2	.0
15.0 to 16.9	566.2	.0	82.3	65.8	178.4	.0	62.2	164.4	.0	13.1	.0
17.0 to 18.9	326.5	.0	33.4	22.3	110.9	.0	36.5	119.5	.0	3.9	.0
19.0 to 20.9	229.5	.0	14.7	5.9	102.8	.0	19.2	82.5	.0	4.4	.0
21.0 to 28.9	243.7	.0	7.9	.8	130.7	.0	12.1	85.3	.0	6.9	.0
29.0+	38.8	.0	.7	.0	29.7	.0	.0	5.3	.0	3.1	.0
Total	7,605.9	.0	657.0	1,257.5	2,234.7	.0	909.4	2,284.3	.0	263.0	.0
Lake States:											
5.0 to 6.9	2,974.0	.0	.0	.0	230.7	477.2	1,517.9	57.0	.0	686.7	4.5
7.0 to 8.9	2,862.7	.0	.0	.0	243.1	528.0	1,256.5	108.6	.0	720.3	6.2
9.0 to 10.9	1,977.5	.0	.0	.0	258.2	333.6	695.6	170.3	.0	514.9	4.9
11.0 to 12.9	1,279.3	.0	.0	.0	286.6	190.2	314.4	190.0	.0	294.8	3.3
13.0 to 14.9	873.1	.0	.0	.0	310.1	70.1	139.9	180.8	.0	170.7	1.5
15.0 to 16.9	658.7	.0	.0	.0	302.6	27.3	75.6	159.4	.0	92.4	1.4
17.0 to 18.9	470.0	.0	.0	.0	267.3	4.9	32.6	114.2	.0	50.5	.5
19.0 to 20.9	306.6	.0	.0	.0	175.3	.7	15.0	86.7	.0	28.3	.6
21.0 to 28.9	446.2	.0	.0	.0	254.4	.6	10.9	143.7	.0	36.6	.0
29.0+	52.6	.0	.0	.0	40.0	.0	.0	10.9	.0	1.7	.0
Total	11,900.7	.0	.0	.0	2,368.3	1,632.6	4,058.4	1,221.6	.0	2,596.9	22.9
Central States:											
5.0 to 6.9	273.6	.0	58.0	107.2	9.6	.3	.0	1.0	.0	91.7	5.8
7.0 to 8.9	359.0	.0	89.4	171.5	10.7	.5	.0	2.0	.1	71.3	13.5
9.0 to 10.9	383.6	.0	91.6	207.3	5.0	.3	.0	2.2	.0	56.6	20.6
11.0 to 12.9	309.8	.0	70.3	177.4	3.5	.0	.0	1.5	2.1	30.8	24.2
13.0 to 14.9	165.2	.0	29.2	90.6	1.5	.0	.0	.6	1.5	20.2	21.6
15.0 to 16.9	96.8	.0	12.1	53.0	.9	.0	.0	.4	1.0	16.2	13.2
17.0 to 18.9	41.4	.0	6.0	16.3	.0	.0	.0	.5	2.1	9.7	6.8
19.0 to 20.9	22.4	.0	2.1	4.6	.0	.0	.0	.0	1.2	9.4	5.1
21.0 to 28.9	23.7	.0	.0	.2	.2	.0	.0	.6	6.3	13.5	2.9
29.0+	8.7	.0	.0	.0	.0	.0	.0	.0	6.7	2.0	.0
Total	1,684.2	.0	358.7	828.1	31.4	1.1	.0	8.8	21.0	321.4	113.7
Total, North:											
5.0 to 6.9	10,886.5	.0	103.2	282.7	1,307.2	477.5	6,473.0	1,004.3	.0	1,228.3	10.3
7.0 to 8.9	10,476.3	.0	179.3	519.9	1,447.6	528.5	5,453.5	1,017.4	.1	1,310.3	19.7
9.0 to 10.9	7,792.4	.0	218.7	532.5	1,277.7	333.9	3,410.7	1,021.3	.0	972.1	25.5
11.0 to 12.9	5,466.2	.0	199.1	441.9	1,219.0	190.2	1,806.2	976.3	2.1	603.9	27.5
13.0 to 14.9	3,585.1	.0	156.2	236.7	1,103.5	70.1	910.9	741.4	1.5	341.7	23.1
15.0 to 16.9	2,466.0	.0	94.4	125.9	989.4	27.3	484.5	545.2	1.0	183.7	14.6
17.0 to 18.9	1,528.9	.0	39.4	43.5	740.9	4.9	240.8	356.1	2.1	93.9	7.3
19.0 to 20.9	936.0	.0	16.8	10.5	513.5	.7	100.5	237.7	1.2	49.4	5.7
21.0 to 28.9	1,237.2	.0	7.9	1.0	774.9	.6	64.3	310.6	6.3	68.7	2.9
29.0+	199.5	.0	.7	.0	157.8	.0	1.4	24.0	6.7	8.9	.0
Total	44,574.1	.0	1,015.7	2,194.6	9,531.5	1,633.7	18,945.8	6,234.3	21.0	4,860.9	136.6
South Atlantic:											
5.0 to 6.9	2,781.9	189.5	1,530.4	875.3	52.6	.0	1.2	22.0	29.9	81.0	.0
7.0 to 8.9	3,972.8	242.1	2,247.3	1,232.4	101.7	.0	5.6	21.8	59.0	62.9	.0
9.0 to 10.9	4,310.6	297.6	2,515.5	1,200.3	109.8	.0	8.2	28.2	98.8	52.2	.0
11.0 to 12.9	3,852.0	300.7	2,447.4	803.7	110.9	.0	4.0	21.5	134.6	29.2	.0
13.0 to 14.9	3,120.3	237.8	2,110.0	447.8	115.8	.0	2.1	38.6	149.9	18.3	.0
15.0 to 16.9	2,196.7	128.9	1,576.4	237.5	97.9	.0	1.7	25.2	123.0	6.1	.0
17.0 to 18.9	1,289.9	50.6	933.1	109.8	76.0	.0	.5	20.9	93.8	5.2	.0
19.0 to 20.9	781.5	17.0	563.5	56.1	42.9	.0	.0	28.5	69.1	4.4	.0
21.0 to 28.9	903.7	13.9	595.7	32.8	93.0	.0	.0	47.8	117.6	2.9	.0
29.0+	123.6	1.1	33.1	.3	22.5	.0	.0	29.1	37.5	.0	.0
Total	23,333.0	1,479.2	14,552.4	4,996.0	823.1	.0	23.3	283.6	913.2	262.2	.0

Table 3.23—*Net volume of softwood growing stock on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million cubic feet]

Section, region and diameter class	Total softwoods	Softwoods: Longleaf and slash pine	Loblolly and shortleaf pine	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
East Gulf:											
5.0 to 6.9	3,703.1	1,750.1	1,283.2	256.3	9.4	.0	.0	.4	388.8	14.9	.0
7.0 to 8.9	4,809.2	2,160.7	1,771.7	313.9	9.7	.0	.0	1.0	537.0	15.2	.0
9.0 to 10.9	4,842.9	2,171.3	1,851.9	281.5	16.3	.0	.0	3.9	498.7	19.3	.0
11.0 to 12.9	4,135.7	1,774.3	1,669.5	209.9	18.8	.0	.0	1.1	445.8	16.3	.0
13.0 to 14.9	2,932.4	1,134.0	1,289.7	139.5	14.7	.0	.0	.5	341.0	13.0	.0
15.0 to 16.9	1,862.1	612.9	892.2	96.1	29.1	.0	.0	1.4	221.2	9.2	.0
17.0 to 18.9	1,049.8	272.2	559.3	56.8	19.3	.0	.0	1.8	133.7	6.7	.0
19.0 to 20.9	536.1	130.8	292.5	18.1	24.9	.0	.0	1.8	65.6	2.4	.0
21.0 to 28.9	488.2	82.2	248.4	21.8	42.4	.0	.0	4.3	87.3	1.8	.0
29.0+	45.5	4.1	12.2	2.2	3.2	.0	.0	2.8	20.6	.4	.0
Total	24,405.0	10,092.6	9,870.6	1,396.1	187.8	.0	.0	19.0	2,739.7	99.2	.0
Central Gulf:											
5.0 to 6.9	2,804.6	334.9	2,076.6	293.4	6.7	.0	.0	3.0	10.1	79.9	.0
7.0 to 8.9	4,177.9	632.7	3,076.1	341.8	16.8	.0	.0	9.6	21.1	79.8	.0
9.0 to 10.9	4,417.5	765.3	3,245.1	310.2	25.1	.0	.0	9.3	27.8	34.7	.0
11.0 to 12.9	4,017.6	719.1	2,943.3	264.1	26.9	.0	.0	9.8	31.4	23.0	.0
13.0 to 14.9	3,010.4	530.7	2,219.6	176.0	28.1	.0	.0	11.3	36.7	8.0	.0
15.0 to 16.9	2,146.5	299.5	1,673.1	87.8	23.2	.0	.0	11.0	46.2	5.7	.0
17.0 to 18.9	1,363.7	132.9	1,094.9	66.1	21.9	.0	.0	3.5	40.5	3.9	.0
19.0 to 20.9	760.2	49.8	612.2	45.3	12.7	.0	.0	5.6	33.9	.7	.0
21.0 to 28.9	786.1	19.2	647.3	29.5	25.7	.0	.0	5.8	57.6	1.0	.0
29.0+	70.9	.0	37.7	2.2	5.3	.0	.0	1.2	24.5	.0	.0
Total	23,555.4	3,484.1	17,625.9	1,616.4	192.4	.0	.0	70.1	329.8	236.7	.0
West Gulf:											
5.0 to 6.9	2,254.9	242.5	1,929.6	4.2	.0	.0	.0	.0	46.2	32.4	.0
7.0 to 8.9	3,384.1	285.7	2,961.9	7.7	.0	.0	.0	.0	107.1	21.7	.0
9.0 to 10.9	4,172.2	254.9	3,778.5	12.0	.0	.0	.0	.0	115.6	11.2	.0
11.0 to 12.9	4,271.2	253.8	3,822.9	12.1	.0	.0	.0	.0	170.0	12.4	.0
13.0 to 14.9	3,819.7	182.2	3,393.7	19.7	.0	.0	.0	.0	218.4	5.7	.0
15.0 to 16.9	2,919.5	134.7	2,542.8	14.1	.0	.0	.0	.0	226.5	1.4	.0
17.0 to 18.9	2,023.1	73.1	1,768.7	10.1	.0	.0	.0	.0	169.3	1.9	.0
19.0 to 20.9	1,309.7	28.3	1,153.7	4.2	.0	.0	.0	.0	122.9	.6	.0
21.0 to 28.9	1,534.9	15.8	1,304.6	9.2	.0	.0	.0	.0	205.3	.0	.0
29.0+	153.6	.6	77.1	2.4	.0	.0	.0	.0	73.5	.0	.0
Total	25,842.9	1,471.6	22,733.5	95.7	.0	.0	.0	.0	1,454.8	87.3	.0
Total South:											
5.0 to 6.9	11,544.5	2,517.0	6,819.8	1,429.2	68.7	.0	1.2	25.4	475.0	208.2	.0
7.0 to 8.9	16,344.0	3,321.2	10,057.0	1,895.8	128.2	.0	5.6	32.4	724.2	179.6	.0
9.0 to 10.9	17,743.2	3,489.1	11,391.0	1,804.0	151.2	.0	8.2	41.4	740.9	117.4	.0
11.0 to 12.9	16,276.5	3,047.9	10,883.1	1,289.8	156.6	.0	4.0	32.4	781.8	80.9	.0
13.0 to 14.9	12,882.8	2,084.7	9,013.0	783.0	158.6	.0	2.1	50.4	746.0	45.0	.0
15.0 to 16.9	9,124.8	1,176.0	6,684.5	435.5	150.2	.0	1.7	37.6	616.9	22.4	.0
17.0 to 18.9	5,726.5	528.8	4,356.0	242.8	117.2	.0	.5	26.2	437.3	17.7	.0
19.0 to 20.9	3,387.5	225.9	2,621.9	123.7	80.5	.0	.0	35.9	291.5	8.1	.0
21.0 to 28.9	3,712.9	131.1	2,796.0	93.3	161.1	.0	.0	57.9	467.8	5.7	.0
29.0+	393.6	5.8	160.1	7.1	31.0	.0	.0	33.1	156.1	.4	.0
Total	97,136.3	16,527.5	64,782.4	8,104.2	1,203.3	.0	23.3	372.7	5,437.5	685.4	.0
Total, eastern regions:											
5.0 to 6.9	22,431.0	2,517.0	6,923.0	1,711.9	1,375.9	477.5	6,474.2	1,029.7	475.0	1,436.5	10.3
7.0 to 8.9	26,820.3	3,321.2	10,236.3	2,415.7	1,575.8	528.5	5,459.1	1,049.8	724.3	1,489.9	19.7
9.0 to 10.9	25,535.6	3,489.1	11,609.7	2,335.5	1,428.9	333.9	3,418.9	1,062.7	740.9	1,089.5	25.5
11.0 to 12.9	21,742.7	3,047.9	11,082.2	1,731.7	1,375.6	190.2	1,810.2	1,008.7	783.9	684.8	27.5
13.0 to 14.9	16,467.9	2,084.7	9,169.2	1,019.7	1,262.1	70.1	913.0	791.8	747.5	386.7	23.1
15.0 to 16.9	11,590.8	1,176.0	6,778.9	561.4	1,139.6	27.3	486.2	582.8	617.9	206.1	14.6
17.0 to 18.9	7,255.4	528.8	4,395.4	286.3	858.1	4.9	241.3	382.3	439.4	111.6	7.3
19.0 to 20.9	4,323.5	225.9	2,638.7	134.2	594.0	.7	100.5	273.6	292.7	57.5	5.7
21.0 to 28.9	4,950.1	131.1	2,803.9	94.3	936.0	.6	64.3	368.5	474.1	74.4	2.9
29.0+	593.1	5.8	160.8	7.1	188.8	.0	1.4	57.1	162.8	9.3	.0
Total	141,710.4	16,527.5	65,798.1	10,298.8	10,734.8	1,633.7	18,969.1	6,607.0	5,458.5	5,546.3	136.6

Table 3.24—*Net volume of hardwood growing stock on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977*

[Million cubic feet]

Section, region and diameter class	Total hardwoods	Hardwoods: Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory	Yellow birch	Hard maple	Soft maple	Beech	Sweetgum	Tupelo and blackgum	Ash	Basswood	Yellow-poplar	Cottonwood and aspen	Black walnut	Black cherry	Other eastern hardwoods
New England:																			
5.0 to 6.9	3,455.5	84.5	203.9	15.7	78.8	33.8	266.3	454.6	1,000.4	234.1	.0	.0	153.2	17.3	.0	230.5	.0	62.6	619.8
7.0 to 8.9	3,712.4	96.7	288.4	9.8	115.0	45.7	263.7	499.2	1,028.2	261.3	.0	.0	174.1	12.1	.0	299.4	.0	47.7	571.1
9.0 to 10.9	3,400.7	88.6	352.2	11.4	135.8	36.0	281.5	518.1	784.5	249.5	.0	.0	157.3	8.2	.0	245.1	.0	47.0	485.5
11.0 to 12.9	2,750.9	70.7	341.4	5.6	150.0	31.6	275.2	454.8	554.0	206.1	.0	.0	150.5	18.7	.0	154.8	.0	28.2	309.3
13.0 to 14.9	1,975.6	62.7	266.1	9.9	114.0	17.2	211.2	375.0	359.8	182.1	.0	.0	96.2	9.0	.0	79.6	.0	14.5	178.3
15.0 to 16.9	1,224.9	23.8	192.9	3.3	72.9	9.1	131.6	272.5	215.4	113.1	.0	.0	62.6	8.2	.0	32.7	.0	7.6	79.2
17.0 to 18.9	766.7	30.7	152.3	2.1	53.3	6.1	92.6	199.3	81.3	49.2	.0	.0	26.1	.0	.0	15.6	.0	6.1	52.0
19.0 to 20.9	473.1	15.9	93.7	1.6	31.0	9.8	57.4	136.8	52.6	23.7	.0	.0	9.6	10.5	.0	1.4	.0	1.3	27.8
21.0 to 28.9	627.2	21.0	105.5	.0	33.4	13.8	68.1	218.3	59.3	26.3	.0	.0	27.6	3.2	.0	.7	.0	2.7	47.3
29.0+	77.3	3.4	19.2	.0	4.4	.0	6.7	20.0	11.2	.9	.0	.0	2.9	.0	.0	.0	.0	.0	8.6
Total	18,464.3	498.0	2,015.6	59.4	788.6	203.1	1,654.3	3,148.6	4,146.7	1,346.3	.0	.0	860.1	87.2	.0	1,059.8	.0	217.7	2,378.9
Middle Atlantic:																			
5.0 to 6.9	7,032.3	522.1	468.0	674.6	374.3	397.0	151.6	845.3	1,452.5	326.5	49.0	76.2	272.9	77.7	167.8	249.4	21.6	265.1	640.7
7.0 to 8.9	8,507.4	658.4	740.2	853.6	537.0	434.2	180.0	935.0	1,477.3	349.0	67.2	58.6	315.3	154.8	251.9	344.5	29.5	423.2	697.7
9.0 to 10.9	8,874.4	700.6	884.1	876.1	593.4	454.5	146.1	905.1	1,399.8	411.2	70.4	54.9	348.3	223.8	308.6	271.4	35.2	542.1	648.8
11.0 to 12.9	7,121.1	617.8	822.2	644.1	532.4	380.1	102.5	642.8	897.6	365.1	62.7	47.1	313.2	182.7	384.8	139.0	23.9	504.4	458.7
13.0 to 14.9	5,814.6	505.0	732.2	532.2	579.2	267.2	82.2	479.6	540.7	323.8	48.3	42.8	232.8	125.1	456.2	63.3	29.8	441.1	333.1
15.0 to 16.9	4,233.5	397.0	624.5	346.7	468.4	175.7	54.4	313.3	324.1	282.1	41.0	42.9	139.0	98.4	375.3	20.6	16.9	271.8	241.4
17.0 to 18.9	2,791.7	267.4	471.2	254.5	320.9	101.4	35.8	195.7	193.8	164.5	24.5	29.2	83.4	48.1	275.9	8.3	13.7	165.2	138.2
19.0 to 20.9	1,766.9	199.5	333.6	138.1	222.6	59.6	24.9	123.7	91.2	100.6	10.5	19.0	39.3	34.6	153.9	3.5	8.9	104.8	98.6
21.0 to 28.9	2,340.3	255.6	457.5	187.2	361.3	61.8	36.0	172.0	148.7	131.4	19.8	29.3	51.7	39.3	189.9	2.3	9.7	74.1	112.7
29.0+	373.3	69.9	78.9	25.7	58.9	6.0	4.2	26.2	15.5	14.1	1.1	.3	5.2	.7	29.3	1.0	.0	4.8	31.5
Total	48,855.5	4,193.3	5,612.4	4,532.8	4,048.4	2,337.5	817.7	4,638.7	6,541.2	2,468.3	394.5	400.3	1,801.1	985.2	2,593.6	1,103.3	189.2	2,796.6	3,401.4
Lake States:																			
5.0 to 6.9	5,771.2	150.1	266.4	.0	123.7	43.4	75.1	785.5	550.2	51.5	.0	.0	446.9	239.9	1.2	1,788.2	.2	67.0	1,181.9
7.0 to 8.9	6,987.0	204.3	410.0	.0	157.5	49.4	94.2	701.4	504.9	57.7	.0	.0	470.5	362.3	.8	2,522.2	1.5	72.6	1,377.7
9.0 to 10.9	6,330.3	237.8	452.1	.0	168.1	62.6	117.3	626.5	421.4	72.4	.0	.0	373.6	335.8	.7	2,268.2	1.2	55.5	1,137.1
11.0 to 12.9	4,588.9	217.8	393.5	.0	154.0	33.8	116.9	501.6	309.4	80.7	.0	.0	254.8	264.8	.8	1,436.6	2.5	34.2	787.5
13.0 to 14.9	3,341.4	202.1	391.5	.0	128.1	29.6	118.6	485.1	262.2	76.6	.0	.0	162.3	200.1	.6	742.2	3.1	18.9	520.4
15.0 to 16.9	2,187.6	152.1	307.4	.0	91.5	15.5	110.1	383.2	141.4	83.4	.0	.0	102.8	131.6	1.7	311.9	3.0	14.3	337.7
17.0 to 18.9	1,346.0	94.0	202.9	.0	51.4	3.9	74.8	291.8	97.7	64.8	.0	.0	40.7	73.0	.6	121.8	.8	9.2	218.6
19.0 to 20.9	816.0	59.3	156.0	.0	36.7	6.4	51.8	163.2	56.8	30.8	.0	.0	18.6	44.7	.0	52.4	.9	1.0	137.4
21.0 to 28.9	1,081.5	81.9	203.4	.0	40.7	3.9	69.6	198.4	74.6	37.6	.0	.0	28.5	54.9	2.8	47.7	.8	2.0	234.7
29.0+	166.1	14.6	25.3	.0	3.1	.0	13.1	12.8	17.8	.4	.0	.0	1.9	3.2	.0	8.7	.0	.5	64.7
Total	32,616.0	1,414.0	2,808.5	.0	954.8	248.5	841.5	4,149.5	2,436.4	555.9	.0	.0	1,900.6	1,710.3	9.2	9,299.9	14.0	275.2	5,997.7
Central States:																			
5.0 to 6.9	3,176.3	469.4	99.7	285.5	431.3	525.9	.0	169.7	170.1	38.7	23.0	34.3	166.1	27.5	142.5	47.3	67.0	38.6	439.7
7.0 to 8.9	3,859.8	622.1	158.6	323.7	598.4	586.5	.0	191.0	165.8	56.9	34.6	42.6	188.2	26.0	185.6	57.9	92.6	52.4	476.9
9.0 to 10.9	4,408.9	760.5	206.5	377.6	750.2	657.6	.0	180.6	163.2	63.1	44.4	41.8	206.1	40.7	237.3	69.4	92.0	44.5	473.4
11.0 to 12.9	4,164.0	784.4	223.6	359.8	733.0	524.6	.0	157.9	133.7	78.9	45.7	54.2	190.6	39.9	234.0	70.6	86.3	37.6	409.2
13.0 to 14.9	3,832.2	763.6	245.2	320.3	689.8	441.2	.0	147.2	144.7	87.1	33.7	45.2	150.7	40.6	234.0	62.8	81.4	30.2	314.5
15.0 to 16.9	3,065.3	599.1	241.2	229.4	579.7	295.7	.0	129.3	108.6	94.2	23.1	34.3	120.5	37.0	176.6	52.7	57.0	19.6	267.3
17.0 to 18.9	2,138.5	383.4	185.0	144.9	412.8	190.7	.0	82.4	76.3	93.0	12.6	28.7	74.2	29.2	126.7	56.3	23.9	9.1	209.3
19.0 to 20.9	1,373.7	204.6	150.9	86.1	253.9	102.0	.0	42.2	57.3	84.8	11.7	13.8	47.3	17.7	82.1	52.2	17.8	4.4	144.9
21.0 to 28.9	2,157.6	341.4	307.9	98.2	341.8	109.5	.0	60.2	86.1	169.4	14.3	12.1	59.9	18.9	104.5	177.9	9.3	7.2	239.0
29.0+	458.7	59.9	44.8	34.5	71.6	10.0	.0	4.7	39.6	37.2	2.0	.5	6.8	3.6	14.1	54.6	.0	.0	74.8
Total	28,635.0	4,988.4	1,863.4	2,260.0	4,862.5	3,443.7	.0	1,165.2	1,145.4	803.3	245.1	307.5	1,210.4	281.1	1,537.4	701.7	527.3	243.6	3,049.0

Table 3.24—*Net volume of hardwood growing stock on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million cubic feet]

Section, region and diameter class	Total hardwoods	Hardwoods: Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hick-ory	Yellow birch	Hard maple	Soft maple	Beech	Sweet-gum	Tupelo and black-gum	Ash	Bass-wood	Yellow-poplar	Cotton-wood and aspen	Black walnut	Black cherry	Other eastern hardwoods
Total, North:																			
5.0 to 6.9	19,435.3	1,226.1	1,038.0	975.8	1,008.1	1,000.1	493.0	2,255.1	3,173.2	650.8	72.0	110.5	1,039.1	362.4	311.5	2,315.4	88.8	433.3	2,882.1
7.0 to 8.9	23,066.6	1,581.5	1,597.2	1,187.1	1,407.9	1,115.8	537.9	2,326.6	3,176.2	724.9	101.8	101.2	1,148.1	555.2	438.3	3,224.0	123.6	595.9	3,123.4
9.0 to 10.9	23,014.3	1,787.5	1,894.9	1,265.1	1,647.5	1,210.7	544.9	2,230.3	2,768.9	796.2	114.8	96.7	1,085.3	608.5	546.6	2,854.1	128.4	689.1	2,744.8
11.0 to 12.9	18,624.9	1,690.7	1,780.7	1,009.5	1,569.4	970.1	494.6	1,757.1	1,894.7	730.8	108.4	101.3	909.1	506.1	619.6	1,801.0	112.7	604.4	1,964.7
13.0 to 14.9	14,963.8	1,533.4	1,635.0	862.4	1,511.1	755.2	412.0	1,486.9	1,307.4	669.6	82.0	88.0	642.0	374.8	690.8	947.9	114.3	504.7	1,346.3
15.0 to 16.9	10,711.3	1,172.0	1,366.0	579.4	1,212.5	496.0	296.1	1,098.3	789.5	572.8	64.1	77.2	424.9	275.2	553.6	417.9	76.9	313.3	925.6
17.0 to 18.9	7,042.9	775.5	1,011.4	401.5	838.4	302.1	203.2	769.2	449.1	371.5	37.1	57.9	224.4	150.3	403.2	202.0	38.4	189.6	618.1
19.0 to 20.9	4,429.7	479.3	734.2	225.8	544.2	177.8	134.1	465.9	257.9	239.9	22.2	32.8	114.8	107.5	236.0	109.5	27.6	111.5	408.7
21.0 to 28.9	6,206.6	699.9	1,074.3	285.4	777.2	189.0	173.7	648.9	368.7	364.7	34.1	41.4	167.7	116.3	297.2	228.6	19.8	86.0	633.7
29.0+	1,075.4	147.8	168.2	60.2	138.0	16.0	24.0	63.7	84.1	52.6	3.1	.8	16.8	7.5	43.4	64.3	.0	5.3	179.6
Total	128,570.8	11,093.7	12,299.9	6,852.2	10,654.3	6,232.8	3,313.5	13,102.0	14,269.7	5,173.8	639.6	707.8	5,772.2	3,063.8	4,140.2	12,164.7	730.5	3,533.1	14,827.0
South Atlantic:																			
5.0 to 6.9	3,307.1	387.1	108.1	271.1	565.9	210.6	13.9	28.7	370.1	45.9	386.4	217.1	75.7	7.0	341.3	5.1	9.0	16.2	247.9
7.0 to 8.9	4,612.8	528.2	163.9	390.7	784.2	288.7	5.7	24.9	403.5	43.9	547.7	378.9	108.0	17.7	508.8	6.1	15.1	16.8	380.0
9.0 to 10.9	5,406.3	650.4	206.1	468.9	906.4	347.1	4.7	30.6	420.4	62.2	571.9	503.3	114.2	23.3	677.3	11.6	15.8	13.3	378.8
11.0 to 12.9	5,552.7	671.5	235.3	440.9	876.9	349.8	1.4	30.7	360.6	80.6	581.4	562.7	123.0	40.8	810.3	9.2	21.3	12.1	344.2
13.0 to 14.9	5,139.7	619.3	242.6	435.7	800.5	349.7	6.8	30.1	284.6	90.3	503.0	568.8	109.5	29.4	754.1	12.0	19.1	14.1	270.1
15.0 to 16.9	4,124.2	517.4	217.2	365.7	641.6	260.6	7.7	22.2	213.9	73.4	407.3	461.1	97.1	31.2	582.7	11.0	9.6	5.4	199.1
17.0 to 18.9	3,003.0	353.8	179.7	237.6	486.2	203.7	2.8	22.6	157.1	77.1	288.4	325.8	66.4	14.8	411.3	6.1	9.0	5.6	155.0
19.0 to 20.9	1,925.4	238.9	164.4	178.9	305.3	109.4	2.5	15.7	102.6	47.0	175.4	186.4	25.7	8.1	249.4	6.0	7.1	2.7	99.9
21.0 to 28.9	2,993.1	350.3	317.5	334.5	522.5	151.0	7.4	22.9	142.4	96.4	221.9	237.5	49.1	14.5	337.7	13.7	2.6	2.4	168.8
29.0+	590.5	73.7	90.2	85.1	129.2	23.7	.0	3.6	15.7	13.3	33.7	31.5	5.3	2.0	38.7	11.9	1.9	.0	31.0
Total	36,654.8	4,390.6	1,925.0	3,209.1	6,018.7	2,294.3	52.9	232.0	2,470.9	630.1	3,717.1	3,473.1	774.0	188.8	4,711.6	92.7	110.5	88.6	2,274.8
East Gulf:																			
5.0 to 6.9	1,875.7	95.9	35.3	85.5	413.6	96.2	.0	3.4	115.9	.8	307.8	350.7	61.2	3.2	95.0	.6	1.4	9.9	199.3
7.0 to 8.9	2,324.2	117.0	32.7	115.0	479.6	118.1	.0	2.2	149.5	1.2	390.8	480.2	86.0	3.9	118.8	.0	1.2	12.9	215.1
9.0 to 10.9	2,528.0	138.4	43.0	128.7	480.5	129.0	.0	4.6	152.0	2.6	425.6	547.0	90.2	5.3	150.5	.2	.2	10.5	219.7
11.0 to 12.9	2,421.2	125.8	40.2	123.2	440.8	136.1	.0	3.5	125.7	4.8	368.2	539.2	86.1	6.4	191.7	2.0	1.6	3.6	222.3
13.0 to 14.9	2,064.0	121.5	36.2	126.6	391.3	122.6	.0	4.0	101.6	10.0	297.4	442.9	72.7	4.7	148.8	.7	.6	1.9	180.5
15.0 to 16.9	1,486.3	76.9	33.5	106.2	307.5	89.6	.0	2.1	73.5	5.8	178.9	292.6	52.5	4.0	132.2	2.1	.3	2.4	126.2
17.0 to 18.9	980.6	47.6	32.0	79.8	225.4	59.4	.0	1.0	55.1	9.0	95.3	180.1	35.8	3.2	73.5	1.6	.4	2.0	79.4
19.0 to 20.9	651.1	41.1	22.7	72.8	166.9	34.7	.0	.8	26.9	4.5	67.8	100.3	23.2	.7	44.0	.2	.4	.7	43.4
21.0 to 28.9	1,121.1	68.8	37.4	159.8	347.8	64.6	.0	.9	50.3	14.4	86.8	146.7	27.5	1.1	64.1	2.2	.0	.3	48.4
29.0+	277.2	11.3	12.3	89.5	98.1	5.8	.0	.0	5.9	2.0	5.8	19.8	3.8	.0	12.0	.0	.0	.0	10.9
Total	15,729.4	844.3	325.3	1,087.1	3,351.5	856.1	.0	22.5	856.4	55.1	2,224.4	3,099.5	539.0	32.5	1,030.6	9.6	6.1	44.2	1,345.2
Central Gulf:																			
5.0 to 6.9	3,446.7	321.1	90.2	301.7	647.8	348.0	.0	34.0	139.0	16.1	578.6	194.3	107.2	8.0	146.4	5.5	12.0	25.8	471.0
7.0 to 8.9	4,364.1	437.7	131.9	415.9	830.5	505.0	.0	44.2	122.8	28.7	663.2	317.5	119.0	14.6	207.0	11.1	19.3	38.9	456.8
9.0 to 10.9	4,791.3	530.8	193.3	436.3	964.6	584.7	.0	47.1	111.6	37.5	613.2	379.0	120.3	14.9	266.9	9.2	19.8	19.3	442.8
11.0 to 12.9	4,286.3	505.8	196.8	390.4	865.6	536.6	.0	37.0	82.0	34.1	498.1	300.0	97.7	16.4	305.7	11.5	21.3	17.8	369.5
13.0 to 14.9	3,745.3	473.0	187.8	353.9	809.3	429.2	.0	38.7	46.0	39.8	384.4	253.3	106.2	16.1	275.1	17.1	15.7	14.6	285.1
15.0 to 16.9	2,892.5	359.0	179.8	228.9	633.3	295.1	.0	22.8	55.1	45.6	265.9	177.3	84.1	13.1	256.6	21.0	9.0	8.8	237.1
17.0 to 18.9	1,903.8	253.1	131.3	146.7	441.1	177.9	.0	12.2	23.6	33.0	163.1	99.3	50.1	12.1	168.7	16.1	2.4	3.8	169.3
19.0 to 20.9	1,147.9	114.0	90.1	84.2	255.0	105.5	.0	12.0	18.9	36.4	90.5	58.3	46.1	5.7	108.2	19.5	1.7	.3	101.5
21.0 to 28.9	1,568.8	144.3	191.1	102.6	351.6	148.4	.0	13.6	14.2	54.0	118.4	49.4	50.9	10.1	106.9	80.2	.0	1.2	131.9
29.0+	275.3	17.1	32.0	17.8	100.7	12.6	.0	1.2	1.2	6.0	11.5	1.6	3.7	.5	14.0	33.9	.0	.0	21.5
Total	28,422.0	3,155.9	1,424.3	2,478.4	5,899.5	3,143.0	.0	262.8	614.4	331.2	3,386.9	1,830.0	785.3	111.5	1,855.5	225.1	101.2	130.5	2,686.5

Table 3.24—*Net volume of hardwood growing stock on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million cubic feet]

Section, region and diameter class	Total hardwoods	Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hick-ory	Yellow birch	Hard maple	Soft maple	Beech	Sweet-gum	Tupelo and black-gum	Ash	Bass-wood	Yellow-poplar	Cotton-wood and aspen	Black walnut	Black cherry	Other eastern hardwoods
West Gulf:																			
5.0 to 6.9	3,032.4	378.7	106.3	450.6	554.7	316.8	.0	11.7	68.2	4.9	459.4	157.6	113.3	3.7	1.9	10.0	5.8	9.6	379.2
7.0 to 8.9	3,569.6	356.4	151.5	493.2	780.8	354.5	.0	8.3	61.8	9.4	583.6	222.2	126.6	4.2	1.4	18.7	7.9	8.2	380.9
9.0 to 10.9	3,731.4	322.9	162.6	465.5	837.1	357.8	.0	5.1	53.8	23.9	597.0	307.3	152.6	4.2	5.2	19.0	8.3	7.7	401.4
11.0 to 12.9	3,249.0	304.3	147.6	372.4	739.5	292.3	.0	5.1	24.4	30.4	588.2	237.0	109.4	2.6	3.1	25.4	10.2	6.8	350.3
13.0 to 14.9	3,026.0	270.4	149.1	309.3	710.7	254.5	.0	3.4	27.0	33.6	485.4	286.8	103.7	2.3	6.3	32.9	2.3	3.4	344.9
15.9 to 16.9	2,437.3	205.2	134.6	236.1	581.0	188.4	.0	2.6	20.2	38.7	371.7	232.4	87.1	2.0	4.3	36.6	4.3	2.8	289.3
17.0 to 18.9	1,725.8	124.8	101.1	166.0	416.7	131.1	.0	1.6	11.9	26.0	262.0	156.6	73.7	3.0	3.7	38.5	2.1	1.0	206.0
19.0 to 20.9	1,173.7	76.7	76.7	131.2	296.1	79.9	.0	.7	4.8	33.3	140.5	109.9	47.4	.0	2.5	27.2	1.1	.7	145.0
21.0 to 28.9	1,798.6	92.0	127.0	199.4	490.7	196.6	.0	.3	8.1	35.4	174.1	125.2	68.9	4.0	3.1	38.5	.0	1.1	234.2
29.0+	323.0	12.7	25.6	26.9	94.9	65.7	.0	.0	.9	2.9	19.7	18.4	5.8	.0	.8	27.6	.0	.0	21.1
Total	24,066.8	2,144.1	1,182.1	2,850.6	5,502.2	2,237.6	.0	38.8	281.1	238.5	3,681.6	1,853.4	888.5	26.0	32.3	274.4	42.0	41.3	2,752.3
Total South:																			
5.0 to 6.9	11,661.9	1,182.8	339.9	1,108.9	2,182.0	971.6	13.9	77.8	693.2	67.7	1,732.2	919.7	357.4	21.9	584.6	21.2	28.2	61.5	1,297.4
7.0 to 8.9	14,870.7	1,439.3	480.0	1,414.8	2,875.1	1,266.3	5.7	79.6	737.6	83.2	2,185.3	1,398.8	439.6	40.4	836.0	35.9	43.5	76.8	1,432.8
9.0 to 10.9	16,457.0	1,642.5	605.0	1,499.4	3,188.6	1,418.6	4.7	87.4	737.8	126.2	2,207.7	1,736.6	477.3	47.7	1,099.9	40.0	44.1	50.8	1,442.7
11.0 to 12.9	15,509.2	1,607.4	619.9	1,326.9	2,922.8	1,314.8	1.4	76.3	592.7	149.9	2,035.9	1,638.9	416.2	66.2	1,310.8	48.1	54.4	40.3	1,286.3
13.0 to 14.9	13,975.0	1,484.2	615.7	1,225.5	2,711.8	1,156.0	6.8	76.2	459.2	173.7	1,670.2	1,551.8	392.1	52.5	1,184.3	62.7	37.7	34.0	1,080.6
15.0 to 16.9	10,940.3	1,158.5	565.1	936.9	2,163.4	833.7	7.7	49.7	362.7	163.5	1,223.8	1,163.4	320.8	50.3	975.8	70.7	23.2	19.4	851.7
17.0 to 18.9	7,613.2	779.3	444.1	630.1	1,569.4	572.1	2.8	37.4	247.7	145.1	808.8	761.8	226.0	33.1	657.2	62.3	13.9	12.4	609.7
19.0 to 20.9	4,898.1	470.7	353.9	467.1	1,023.3	329.5	2.5	29.2	153.2	121.2	474.2	454.9	142.4	14.5	404.1	52.9	10.3	4.4	389.8
21.0 to 28.9	7,481.6	655.4	673.0	796.3	1,712.6	560.6	7.4	37.7	215.0	200.2	601.2	558.8	196.4	29.7	511.8	134.6	2.6	5.0	583.3
29.0+	1,466.0	114.8	160.1	219.3	422.9	107.8	.0	4.8	23.7	24.2	70.7	71.3	18.6	2.5	65.5	73.4	1.9	.0	84.5
Total	104,873.0	10,534.9	4,856.7	9,625.2	20,771.9	8,531.0	52.9	556.1	4,222.8	1,254.9	13,010.0	10,256.0	2,986.8	358.8	7,630.0	601.8	259.8	304.6	9,058.8
Total, eastern regions:																			
5.0 to 6.9	31,097.2	2,408.9	1,377.9	2,084.7	3,190.1	1,971.7	506.9	2,332.9	3,866.4	718.5	1,804.2	1,030.2	1,396.5	384.3	896.1	2,336.6	117.0	494.8	4,179.5
7.0 to 8.9	37,937.3	3,020.8	2,077.2	2,601.9	4,283.0	2,382.1	543.6	2,406.2	3,913.8	808.1	2,287.1	1,500.0	1,587.7	595.6	1,274.3	3,259.9	167.1	672.7	4,556.2
9.0 to 10.9	39,471.3	3,430.0	2,499.9	2,764.5	4,836.1	2,629.3	549.6	2,317.7	3,506.7	922.4	2,322.5	1,833.3	1,562.6	656.2	1,646.5	2,894.1	172.5	739.9	4,187.5
11.0 to 12.9	34,134.1	3,298.1	2,400.6	2,336.4	4,492.2	2,284.9	496.0	1,833.4	2,487.4	880.7	2,144.3	1,740.2	1,325.3	572.3	1,930.4	1,849.1	167.1	644.7	3,251.0
13.0 to 14.9	28,938.8	3,017.6	2,250.7	2,087.9	4,222.9	1,911.2	418.8	1,563.1	1,766.6	843.3	1,752.2	1,639.8	1,034.1	427.3	1,875.1	1,010.6	152.0	538.7	2,426.9
15.0 to 16.9	21,651.6	2,330.5	1,931.1	1,516.3	3,375.9	1,329.7	303.8	1,148.0	1,152.2	736.3	1,287.9	1,240.6	745.7	325.5	1,529.4	488.6	100.1	332.7	1,777.3
17.0 to 18.9	14,656.1	1,554.8	1,455.5	1,031.6	2,407.8	874.2	206.0	806.6	696.8	516.6	845.9	819.7	450.4	183.4	1,060.4	264.3	52.3	202.0	1,227.8
19.0 to 20.9	9,327.8	950.0	1,088.1	692.9	1,567.5	507.3	136.6	495.1	411.1	361.1	496.4	487.7	257.2	122.0	640.1	162.4	37.9	115.9	798.5
21.0 to 28.9	13,688.2	1,355.3	1,747.3	1,081.7	2,489.8	749.6	181.1	686.6	583.7	564.9	635.3	600.2	364.1	146.0	809.0	363.2	22.4	91.0	1,217.0
29.0+	2,541.4	262.6	328.3	279.5	560.9	123.8	24.0	68.5	107.8	76.8	73.8	72.1	35.4	10.0	108.9	137.7	1.9	5.3	264.1
Total	233,443.8	21,628.6	17,156.6	16,477.4	31,426.2	14,763.8	3,366.4	13,658.1	18,492.5	6,428.7	13,649.6	10,963.8	8,759.0	3,422.6	11,770.2	12,766.5	990.3	3,837.7	23,885.8

Table 3.25—*Net volume of softwood sawtimber on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977*

[Million board feet, International 1/4-inch log rule]

Section, region and diameter class	Total softwoods	Softwoods: Longleaf and slash pine	Loblolly and shortleaf pine	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
New England:											
9.0 to 10.9	13,743.3	.0	.0	76.8	2,268.9	.0	8,641.2	1,594.6	.0	1,161.8	.0
11.0 to 12.9	10,515.6	.0	.0	80.3	2,637.3	.0	5,116.5	1,763.6	.0	917.9	.0
13.0 to 14.9	7,083.9	.0	.0	62.6	2,463.6	.0	2,712.8	1,311.4	.0	533.5	.0
15.0 to 16.9	4,879.6	.0	.0	32.1	2,236.3	.0	1,420.9	947.1	.0	243.2	.0
17.0 to 18.9	3,041.7	.0	.0	23.0	1,662.0	.0	707.5	531.7	.0	117.5	.0
19.0 to 20.9	1,704.5	.0	.0	.0	1,091.3	.0	285.2	296.2	.0	31.8	.0
21.0 to 28.9	2,377.4	.0	.0	.0	1,795.6	.0	173.5	353.7	.0	54.6	.0
29.0+	453.6	.0	.0	.0	406.0	.0	7.5	28.6	.0	11.5	.0
Total	43,799.6	.0	.0	274.8	14,561.0	.0	19,065.1	6,826.9	.0	3,071.8	.0
Middle Atlantic:											
9.0 to 10.9	4,324.3	.0	359.6	900.1	1,080.0	.0	585.6	1,245.9	.0	153.1	.0
11.0 to 12.9	3,840.1	.0	404.3	835.3	890.0	.0	460.5	1,154.8	.0	95.2	.0
13.0 to 14.9	3,001.8	.0	426.2	498.0	801.4	.0	307.5	915.3	.0	53.4	.0
15.0 to 16.9	2,223.1	.0	288.6	261.0	727.6	.0	250.4	645.1	.0	50.4	.0
17.0 to 18.9	1,349.4	.0	119.5	89.3	471.3	.0	158.2	494.3	.0	16.8	.0
19.0 to 20.9	1,024.6	.0	53.1	22.1	475.6	.0	88.9	365.2	.0	19.7	.0
21.0 to 28.9	1,156.0	.0	27.7	3.9	639.9	.0	59.3	393.2	.0	32.0	.0
29.0+	175.1	.0	2.8	.0	129.3	.0	.0	28.7	.0	14.3	.0
Total	17,094.4	.0	1,681.8	2,609.7	5,215.1	.0	1,910.4	5,242.5	.0	434.9	.0
Lake States:											
9.0 to 10.9	9,088.9	.0	.0	.0	1,380.7	1,513.1	3,084.5	869.3	.0	2,218.8	22.5
11.0 to 12.9	6,165.3	.0	.0	.0	1,567.1	857.7	1,412.2	998.0	.0	1,311.1	19.2
13.0 to 14.9	4,492.9	.0	.0	.0	1,719.1	327.2	673.6	973.8	.0	790.4	8.8
15.0 to 16.9	3,615.0	.0	.0	.0	1,717.0	135.7	387.3	910.4	.0	456.3	8.3
17.0 to 18.9	2,709.0	.0	.0	.0	1,565.1	23.4	179.6	667.2	.0	270.0	3.7
19.0 to 20.9	1,814.2	.0	.0	.0	1,035.3	3.4	86.0	528.2	.0	157.7	3.6
21.0 to 28.9	2,762.0	.0	.0	.0	1,564.7	2.8	65.5	905.8	.0	223.2	.0
29.0+	337.0	.0	.0	.0	247.6	.0	.0	76.3	.0	13.1	.0
Total	30,984.3	.0	.0	.0	10,796.6	2,863.3	5,888.7	5,929.0	.0	5,440.6	66.1
Central States:											
9.0 to 10.9	1,530.2	.0	472.2	716.4	27.1	1.0	.0	11.2	.0	220.9	81.4
11.0 to 12.9	1,369.3	.0	394.3	689.8	20.6	.0	.0	8.8	11.3	125.1	119.4
13.0 to 14.9	769.2	.0	172.3	371.1	8.8	.0	.0	3.6	8.0	83.3	122.1
15.0 to 16.9	457.3	.0	70.2	223.8	6.0	.0	.0	2.3	6.9	67.8	80.3
17.0 to 18.9	208.8	.0	35.7	74.4	.0	.0	.0	3.8	11.4	39.5	44.0
19.0 to 20.9	115.3	.0	13.2	22.8	.0	.0	.0	.0	7.4	38.3	33.6
21.0 to 28.9	124.7	.0	.0	.9	1.3	.0	.0	3.8	38.8	59.1	20.8
29.0+	50.4	.0	.0	.0	.0	.0	.0	.0	42.0	8.1	.3
Total	4,625.2	.0	1,157.9	2,099.2	63.8	1.0	.0	33.5	125.8	642.1	501.9
Total, North:											
9.0 to 10.9	28,686.7	.0	831.8	1,693.3	4,756.7	1,514.1	12,311.3	3,721.0	.0	3,754.6	103.9
11.0 to 12.9	21,890.3	.0	798.6	1,605.4	5,115.0	857.7	6,989.2	3,925.2	11.3	2,449.3	138.6
13.0 to 14.9	15,347.8	.0	598.5	931.7	4,992.9	327.2	3,693.9	3,204.1	8.0	1,460.6	130.9
15.0 to 16.9	11,175.0	.0	358.8	516.9	4,686.9	135.7	2,058.6	2,504.9	6.9	817.7	88.6
17.0 to 18.9	7,308.9	.0	155.2	186.7	3,698.4	23.4	1,045.3	1,697.0	11.4	443.8	47.7
19.0 to 20.9	4,658.6	.0	66.3	44.9	2,602.2	3.4	460.1	1,189.6	7.4	247.5	37.2
21.0 to 28.9	6,420.1	.0	27.7	4.8	4,001.5	2.8	298.3	1,656.5	38.8	368.9	20.8
29.0+	1,016.1	.0	2.8	.0	782.9	.0	7.5	133.6	42.0	47.0	.3
Total	96,503.5	.0	2,839.7	4,983.7	30,636.5	2,864.3	26,864.2	18,031.9	125.8	9,589.4	568.0
South Atlantic:											
9.0 to 10.9	15,222.5	1,179.8	8,995.2	4,037.6	393.7	.0	28.4	94.8	295.8	197.2	.0
11.0 to 12.9	16,401.4	1,374.9	10,584.7	3,244.7	476.0	.0	17.3	89.2	487.6	127.0	.0
13.0 to 14.9	14,737.0	1,145.8	10,112.6	2,020.7	560.2	.0	10.7	181.3	616.7	89.0	.0
15.0 to 16.9	11,143.9	644.0	8,102.8	1,170.4	510.3	.0	9.6	128.8	546.4	31.6	.0
17.0 to 18.9	6,869.4	265.4	5,033.7	565.0	417.4	.0	3.0	113.3	443.0	28.6	.0
19.0 to 20.9	4,214.4	83.9	3,074.4	287.1	246.1	.0	.0	160.7	340.0	22.2	.0
21.0 to 28.9	5,017.9	70.2	3,310.6	171.1	559.3	.0	.0	291.7	599.2	15.8	.0
29.0+	710.8	4.7	187.4	2.0	144.5	.0	.0	193.6	178.6	.0	.0
Total	74,317.3	4,768.7	49,401.4	11,498.6	3,307.5	.0	69.0	1,253.4	3,507.3	511.4	.0

Table 3.25—*Net volume of softwood sawtimber on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977*—*Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section, region and diameter class	Total softwoods	Softwoods: Longleaf and slash pine	Loblolly and shortleaf pine	Other yellow pines	Eastern white and red pines	Jack pine	Spruce and balsam fir	Eastern hemlock	Cypress	Other eastern softwoods	Ponderosa and Jeffrey pine
East Gulf:											
9.0 to 10.9	18,016.2	8,395.1	6,740.5	986.0	55.5	.0	.0	13.1	1,759.0	67.0	.0
11.0 to 12.9	18,874.4	8,247.2	7,685.6	895.2	79.0	.0	.0	4.4	1,899.9	63.1	.0
13.0 to 14.9	14,961.9	5,865.8	6,656.0	679.3	69.0	.0	.0	2.6	1,633.4	55.8	.0
15.0 to 16.9	10,300.7	3,403.9	5,032.0	509.2	150.7	.0	.0	7.4	1,155.0	42.5	.0
17.0 to 18.9	5,830.8	1,517.9	3,157.2	301.8	106.3	.0	.0	9.5	707.4	30.7	.0
19.0 to 20.9	3,020.7	709.5	1,703.0	100.0	143.6	.0	.0	10.5	341.5	12.6	.0
21.0 to 28.9	2,809.5	471.8	1,464.2	122.8	260.4	.0	.0	26.1	453.3	10.9	.0
29.0+	263.9	22.9	76.5	12.0	20.7	.0	.0	19.1	111.0	1.7	.0
Total	74,078.1	28,634.1	32,515.0	3,606.3	885.2	.0	.0	92.7	8,060.5	284.3	.0
Central Gulf:											
9.0 to 10.9	19,261.7	3,399.1	14,207.6	1,292.7	90.0	.0	.0	34.8	108.7	128.8	.0
11.0 to 12.9	20,860.8	3,980.8	15,198.0	1,272.8	121.9	.0	.0	41.4	144.1	101.8	.0
13.0 to 14.9	16,200.0	2,993.3	11,908.6	882.6	135.2	.0	.0	54.9	186.6	38.8	.0
15.0 to 16.9	12,820.1	1,903.2	9,994.9	472.7	115.8	.0	.0	52.1	254.2	27.2	.0
17.0 to 18.9	8,437.9	867.1	6,820.4	379.7	107.5	.0	.0	17.1	225.3	20.8	.0
19.0 to 20.9	4,808.7	338.7	3,911.7	261.6	63.9	.0	.0	32.6	197.0	3.2	.0
21.0 to 28.9	5,078.1	134.4	4,256.6	168.8	132.8	.0	.0	30.0	348.5	7.0	.0
29.0+	435.9	.0	246.7	13.6	25.8	.0	.0	6.1	143.7	.0	.0
Total	87,903.2	13,616.6	66,544.5	4,744.5	792.9	.0	.0	269.0	1,608.1	327.6	.0
West Gulf:											
9.0 to 10.9	16,788.6	1,079.1	15,262.8	43.6	.0	.0	.0	.0	373.6	29.5	.0
11.0 to 12.9	21,070.9	1,287.5	19,009.0	55.9	.0	.0	.0	.0	672.0	46.5	.0
13.0 to 14.9	20,701.8	988.6	18,563.6	100.7	.0	.0	.0	.0	1,023.0	25.9	.0
15.0 to 16.9	16,433.2	755.2	14,505.0	78.4	.0	.0	.0	.0	1,087.9	6.7	.0
17.0 to 18.9	11,785.1	421.9	10,433.6	57.6	.0	.0	.0	.0	862.5	9.5	.0
19.0 to 20.9	7,744.0	163.1	6,926.6	23.1	.0	.0	.0	.0	627.8	3.4	.0
21.0 to 28.9	9,260.9	92.1	8,006.2	54.5	.0	.0	.0	.0	1,108.1	.0	.0
29.0+	939.4	3.7	481.2	17.1	.0	.0	.0	.0	437.4	.0	.0
Total	104,723.9	4,791.2	93,188.0	430.9	.0	.0	.0	.0	6,192.3	121.5	.0
Total, South:											
9.0 to 10.9	69,289.0	14,053.1	45,206.1	6,359.9	539.2	.0	28.4	142.7	2,537.1	422.5	.0
11.0 to 12.9	77,207.5	14,890.4	52,477.3	5,468.6	676.9	.0	17.3	135.0	3,203.6	338.4	.0
13.0 to 14.9	66,600.7	10,993.5	47,240.8	3,683.3	764.4	.0	10.7	238.8	3,459.7	209.5	.0
15.0 to 16.9	50,697.9	6,706.3	37,634.7	2,230.7	776.8	.0	9.6	188.3	3,043.5	108.0	.0
17.0 to 18.9	32,923.2	3,072.3	25,444.9	1,304.1	631.2	.0	3.0	139.9	2,238.2	89.6	.0
19.0 to 20.9	19,787.8	1,295.2	15,615.7	671.8	453.6	.0	.0	203.8	1,506.3	41.4	.0
21.0 to 28.9	22,166.4	768.5	17,037.6	517.2	952.5	.0	.0	347.8	2,509.1	33.7	.0
29.0+	2,350.0	31.3	991.8	44.7	191.0	.0	.0	218.8	870.7	1.7	.0
Total	341,022.5	51,810.6	241,648.9	20,280.3	4,985.6	.0	69.0	1,615.1	19,368.2	1,244.8	.0
Total, eastern regions:											
9.0 to 10.9	97,975.7	14,053.1	46,037.9	8,053.2	5,295.9	1,514.1	12,339.7	3,863.7	2,537.1	4,177.1	103.9
11.0 to 12.9	99,097.8	14,890.4	53,275.9	7,074.0	5,791.9	857.7	7,006.5	4,060.2	3,214.9	2,787.7	138.6
13.0 to 14.9	81,948.5	10,993.5	47,839.3	4,615.0	5,757.3	327.2	3,704.6	3,442.9	3,467.7	1,670.1	130.9
15.0 to 16.9	61,872.9	6,706.3	37,993.5	2,747.6	5,463.7	135.7	2,068.2	2,693.2	3,050.4	925.7	88.6
17.0 to 18.9	40,232.1	3,072.3	25,600.1	1,490.8	4,329.6	23.4	1,048.3	1,836.9	2,249.6	533.4	47.7
19.0 to 20.9	24,446.4	1,295.2	15,682.0	716.7	3,055.8	3.4	460.1	1,393.4	1,513.7	288.9	37.2
21.0 to 28.9	28,586.5	768.5	17,065.3	522.0	4,954.0	2.8	298.3	2,004.3	2,547.9	402.6	20.8
29.0+	3,366.1	31.3	994.6	44.7	973.9	.0	7.5	352.4	912.7	48.7	.3
Total	437,526.0	51,810.6	244,488.6	25,264.0	35,622.1	2,864.3	26,933.2	19,647.0	19,494.0	10,834.2	568.0

Table 3.26—*Net volume of hardwood sawtimber on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977*

[Million board feet, International 1/4-inch log rule]

Section, region and diameter class	Total hardwoods	Hardwoods: Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hick-ory	Yellow birch	Hard maple	Soft maple	Beech	Sweet-gum	Tupelo and black gum	Ash	Bass-wood	Yellow-poplar	Cotton-wood and aspen	Black walnut	Black cherry	Other eastern hardwoods
New England:																			
11.0 to 12.9	9,900.5	241.7	1,237.8	18.7	510.3	109.3	1,008.6	1,660.3	1,962.1	742.5	.0	.0	547.7	68.3	.0	553.0	.0	99.3	1,140.9
13.0 to 14.9	7,824.2	234.5	1,053.8	37.3	430.7	64.1	858.5	1,506.2	1,407.2	731.6	.0	.0	377.8	37.2	.0	317.4	.0	54.9	713.0
15.0 to 16.9	5,161.4	93.6	797.8	13.0	293.6	37.3	577.1	1,172.2	887.1	488.8	.0	.0	259.4	35.1	.0	136.2	.0	32.4	337.8
17.0 to 18.9	3,354.8	126.0	648.6	8.6	218.7	25.0	412.5	905.3	349.3	221.9	.0	.0	109.3	.0	.0	68.0	.0	25.6	236.0
19.0 to 20.9	2,160.1	68.5	412.9	7.1	133.8	43.4	275.9	635.6	232.7	114.2	.0	.0	41.3	50.9	.0	6.9	.0	5.5	131.4
21.0 to 28.9	2,945.9	91.9	474.0	.0	147.9	61.3	336.9	1,060.7	274.1	131.2	.0	.0	122.6	13.3	.0	3.6	.0	11.3	217.1
29.0+	360.3	13.4	85.7	.0	17.2	.0	31.4	97.4	53.7	4.7	.0	.0	14.8	.0	.0	.0	.0	.0	42.0
Total	31,707.2	869.6	4,710.6	84.7	1,752.2	340.4	3,500.9	7,037.7	5,166.2	2,434.9	.0	.0	1,472.9	204.8	.0	1,085.1	.0	229.0	2,818.2
Middle Atlantic:																			
11.0 to 12.9	22,346.0	1,923.8	2,536.2	1,904.4	1,629.1	1,150.0	364.9	2,143.4	2,889.5	1,176.8	199.3	142.2	990.1	595.1	1,151.6	514.0	72.2	1,557.9	1,405.5
13.0 to 14.9	19,872.6	1,693.8	2,472.7	1,722.4	1,931.2	887.5	330.4	1,750.8	1,884.5	1,169.0	178.0	140.5	791.1	448.3	1,502.8	245.2	92.5	1,501.5	1,130.4
15.0 to 16.9	15,136.2	1,370.4	2,179.9	1,180.0	1,652.4	622.5	230.4	1,180.9	1,170.3	1,068.2	158.9	157.1	503.7	358.8	1,322.3	83.7	57.3	976.5	862.9
17.0 to 18.9	10,332.7	979.5	1,695.8	889.8	1,159.2	367.9	155.8	784.5	745.7	653.4	98.2	103.6	315.1	191.1	1,014.0	35.8	47.0	584.0	512.3
19.0 to 20.9	6,702.4	735.2	1,232.0	493.4	819.4	221.8	117.1	501.4	359.7	413.3	43.9	73.9	149.7	146.8	575.3	17.3	33.4	378.1	390.7
21.0 to 28.9	9,028.1	972.2	1,712.3	673.4	1,361.4	230.1	154.5	711.7	583.3	531.5	85.2	117.4	196.8	152.4	736.0	10.4	36.2	300.2	463.1
29.0+	1,447.0	280.8	287.9	100.6	223.0	21.5	21.4	107.8	67.6	58.5	4.6	1.2	20.9	4.4	96.6	4.7	.0	14.3	131.2
Total	84,865.0	7,955.7	12,116.8	6,964.0	8,775.7	3,501.3	1,374.5	7,180.5	7,700.6	5,070.7	768.1	735.9	2,967.4	1,896.9	6,398.6	911.1	338.6	5,312.5	4,896.1
Lake States:																			
11.0 to 12.9	22,311.2	1,048.6	1,982.8	.0	713.7	155.7	486.3	2,424.9	1,385.6	384.8	.0	.0	1,338.6	1,311.6	4.0	7,157.3	9.3	144.7	3,763.3
13.0 to 14.9	16,431.2	938.9	1,956.2	.0	587.4	145.6	528.6	2,417.1	1,249.9	394.9	.0	.0	845.7	997.6	1.5	3,757.7	13.4	72.1	2,524.6
15.0 to 16.9	10,871.6	699.7	1,496.7	.0	417.4	82.6	524.1	1,949.5	670.4	448.7	.0	.0	530.8	664.5	8.8	1,653.2	12.7	56.4	1,656.1
17.0 to 18.9	6,817.3	424.7	976.7	.0	228.9	23.0	365.5	1,562.5	485.9	372.6	.0	.0	219.3	364.6	3.4	652.7	2.5	43.3	1,091.7
19.0 to 20.9	4,070.2	271.5	722.9	.0	169.7	33.9	264.6	873.6	278.2	173.8	.0	.0	97.6	223.1	.0	282.5	3.8	4.4	670.6
21.0 to 28.9	5,472.0	382.8	967.7	.0	176.9	19.5	390.0	1,083.0	358.6	219.7	.0	.0	146.7	273.5	15.9	262.5	3.7	7.6	1,163.9
29.0+	808.3	68.9	124.1	.0	12.6	.0	76.3	73.8	83.2	1.4	.0	.0	10.8	16.1	.0	33.2	.0	2.3	305.6
Total	66,781.8	3,835.1	8,227.1	.0	2,306.6	460.3	2,635.4	10,384.4	4,511.8	1,995.9	.0	.0	3,189.5	3,851.0	33.6	13,799.1	45.4	330.8	11,175.8
Central States:																			
11.0 to 12.9	17,703.0	3,469.2	970.3	1,507.3	3,219.9	2,200.5	.0	660.5	570.8	338.1	167.6	192.5	772.2	166.1	914.7	258.0	363.4	167.9	1,764.0
13.0 to 14.9	17,319.1	3,539.4	1,147.9	1,384.2	3,144.1	1,912.7	.0	687.8	664.7	385.3	139.2	175.6	666.5	190.0	1,014.2	301.2	369.2	143.3	1,453.8
15.0 to 16.9	14,223.9	2,792.5	1,120.5	1,017.8	2,679.9	1,341.0	.0	586.0	512.6	438.5	101.3	148.5	562.0	179.0	809.6	271.5	274.2	96.6	1,292.4
17.0 to 18.9	10,194.5	1,826.2	899.6	651.3	1,967.7	878.9	.0	388.2	370.6	433.0	62.1	128.0	354.7	139.2	592.7	302.9	125.3	44.1	1,030.0
19.0 to 20.9	6,706.7	1,002.0	743.3	395.5	1,236.7	486.5	.0	199.5	276.3	413.0	58.4	66.4	233.9	84.2	390.6	289.1	86.1	22.2	723.0
21.0 to 28.9	10,833.0	1,691.0	1,531.5	487.6	1,685.2	534.9	.0	296.1	427.1	853.8	78.7	61.1	303.4	92.7	528.9	993.7	44.6	33.2	1,189.5
29.0+	2,182.9	275.3	222.7	160.9	306.8	48.6	.0	21.8	189.4	183.4	11.7	3.1	34.8	16.4	68.7	280.2	.0	.0	359.1
Total	79,163.1	14,595.6	6,635.8	5,604.6	14,240.3	7,403.1	.0	2,839.9	3,011.5	3,045.1	619.0	775.2	2,927.5	867.6	4,319.4	2,696.6	1,262.8	507.3	7,811.8

Table 3.26—*Net volume of hardwood sawtimber on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section, region and diameter class	Total hardwoods	Hardwoods: Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hick-ory	Yellow birch	Hard maple	Soft maple	Beech	Sweet-gum	Tupelo and black gum	Ash	Bass-wood	Yellow-poplar	Cotton-wood and aspen	Black walnut	Black cherry	Other eastern hardwoods
Total, North:																			
11.0 to 12.9	72,260.7	6,683.3	6,727.1	3,430.4	6,073.0	3,615.5	1,859.8	6,889.1	6,808.0	2,642.2	366.9	334.7	3,648.6	2,141.1	2,070.3	8,482.3	444.9	1,969.8	8,073.7
13.0 to 14.9	61,447.1	6,406.6	6,630.6	3,143.9	6,093.4	3,009.9	1,717.5	6,361.9	5,206.3	2,680.8	317.2	316.1	2,681.1	1,673.1	2,518.5	4,621.5	475.1	1,771.8	5,821.8
15.0 to 16.9	45,393.1	4,956.2	5,594.9	2,210.8	5,043.3	2,083.4	1,331.6	4,888.6	3,240.4	2,444.2	260.2	305.6	1,855.9	1,237.4	2,140.7	2,144.6	344.2	1,161.9	4,149.2
17.0 to 18.9	30,699.3	3,356.4	4,220.7	1,549.7	3,574.5	1,294.8	933.8	3,640.5	1,951.5	1,680.9	160.3	231.6	998.4	694.9	1,610.1	1,059.4	174.8	697.0	2,870.0
19.0 to 20.9	19,639.4	2,077.2	3,111.1	896.0	2,359.6	785.6	657.6	2,210.1	1,146.9	1,114.3	102.3	140.3	522.5	505.0	965.9	595.8	123.3	410.2	1,915.7
21.0 to 28.9	28,279.0	3,137.9	4,685.5	1,161.0	3,371.4	845.8	881.4	3,151.5	1,643.1	1,736.2	163.9	178.5	769.5	531.9	1,280.8	1,270.2	84.5	352.3	3,033.6
29.0+	4,798.5	638.4	720.4	261.5	559.6	70.1	129.1	300.8	393.9	248.0	16.3	4.3	81.3	36.9	165.3	318.1	.0	16.6	837.9
Total	262,517.1	27,256.0	31,690.3	12,653.3	27,074.8	11,705.1	7,510.8	27,442.5	20,390.1	12,546.6	1,387.1	1,511.1	10,557.3	6,820.3	10,751.6	18,491.9	1,646.8	6,379.6	26,701.9
South Atlantic:																			
11.0 to 12.9	18,362.3	2,167.3	759.1	1,520.4	2,888.8	1,173.9	5.3	112.8	1,097.2	288.4	1,996.8	1,728.3	377.1	140.6	2,829.2	29.0	73.1	42.0	1,133.0
13.0 to 14.9	20,033.6	2,358.0	900.5	1,737.1	3,093.0	1,393.2	26.1	120.2	1,011.0	333.6	2,078.0	2,122.1	408.7	115.1	3,173.2	45.9	66.6	54.8	996.5
15.0 to 16.9	17,714.4	2,188.8	884.6	1,555.8	2,731.1	1,147.3	31.0	95.9	844.9	277.1	1,868.8	1,886.7	389.4	133.3	2,772.7	42.4	34.0	22.7	807.9
17.0 to 18.9	13,701.9	1,602.2	783.5	1,097.0	2,183.5	955.9	11.4	100.9	648.8	294.6	1,406.6	1,438.1	283.8	67.2	2,105.0	26.5	31.6	26.0	639.3
19.0 to 20.9	9,179.9	1,150.9	747.1	839.3	1,423.3	531.6	10.7	72.7	449.9	187.1	878.3	864.0	117.3	39.2	1,353.8	28.2	25.6	13.3	447.6
21.0 to 28.9	14,966.1	1,781.7	1,555.5	1,684.7	2,516.0	778.4	32.9	114.0	656.6	380.5	1,145.7	1,161.0	224.8	74.6	1,975.2	57.6	9.5	12.1	805.3
29.0+	3,125.6	410.4	488.1	443.2	653.0	121.1	.0	19.0	75.2	55.9	178.5	180.1	28.9	11.8	240.5	49.5	6.7	.0	163.7
Total	97,083.8	11,659.3	6,118.4	8,877.5	15,488.7	6,101.4	117.4	635.5	4,783.6	1,817.2	9,552.7	9,380.3	1,830.0	581.8	14,449.6	279.1	247.1	170.9	4,993.3
East Gulf:																			
11.0 to 12.9	8,164.8	421.4	132.5	402.7	1,525.1	460.4	.0	14.1	420.2	15.7	1,327.2	1,681.5	275.9	22.4	704.6	7.5	4.8	9.2	739.6
13.0 to 14.9	8,396.8	494.7	141.8	476.8	1,593.1	502.9	.0	17.9	404.1	41.8	1,304.1	1,730.7	291.8	19.5	668.8	4.2	3.4	6.3	694.9
15.0 to 16.9	6,859.5	354.7	145.5	445.0	1,409.2	433.9	.0	9.8	323.2	27.0	900.6	1,283.6	240.4	17.1	696.0	9.8	1.9	9.7	552.1
17.0 to 18.9	4,812.0	232.4	151.6	352.4	1,106.1	300.7	.0	4.2	268.8	43.4	492.9	874.1	169.2	15.9	407.5	9.4	1.6	9.2	372.6
19.0 to 20.9	3,267.2	209.9	111.4	343.8	836.0	180.1	.0	3.4	134.7	23.4	357.7	480.9	116.2	3.8	256.2	.6	1.1	3.5	204.5
21.0 to 28.9	5,545.9	368.5	187.6	728.2	1,709.9	341.0	.0	4.2	252.0	66.4	441.2	688.9	129.7	5.7	385.6	12.0	.0	2.0	223.0
29.0+	1,354.1	66.5	67.1	397.9	478.0	34.9	.0	.0	32.7	8.7	30.4	94.2	15.5	.0	74.7	.0	.0	.0	53.5
Total	38,400.3	2,148.1	937.5	3,146.8	8,657.4	2,253.9	.0	53.6	1,835.7	226.4	4,854.1	6,833.9	1,238.7	84.4	3,193.4	43.5	12.8	39.9	2,840.2
Central Gulf:																			
11.0 to 12.9	17,098.1	2,110.2	792.0	1,597.7	3,569.5	2,135.3	.0	134.0	305.3	134.9	1,994.3	1,163.1	361.5	62.8	1,145.2	40.4	84.7	63.3	1,403.9
13.0 to 14.9	17,116.9	2,223.0	890.0	1,643.4	3,755.8	1,925.3	.0	161.9	190.2	171.1	1,822.4	1,121.5	461.7	75.8	1,221.6	75.3	72.4	66.7	1,238.8
15.0 to 16.9	14,177.2	1,805.7	896.1	1,114.9	3,151.9	1,434.9	.0	106.3	228.8	214.2	1,356.9	868.5	393.1	62.2	1,216.7	101.6	42.0	42.4	1,141.0
17.0 to 18.9	9,765.4	1,317.8	681.5	740.2	2,351.7	890.5	.0	60.8	104.8	162.4	858.5	501.1	248.0	57.8	827.8	78.6	13.2	20.1	850.6
19.0 to 20.9	6,064.8	623.7	486.5	450.1	1,385.3	544.4	.0	61.0	88.9	189.8	495.5	301.9	220.9	26.3	548.3	103.7	7.2	.9	530.4
21.0 to 28.9	8,611.6	802.4	1,071.2	561.5	1,984.9	822.3	.0	70.4	68.5	267.6	672.6	262.0	244.1	52.5	565.3	446.7	.0	6.8	712.8
29.0+	1,613.8	96.7	183.6	110.4	587.1	72.8	.0	6.6	7.4	33.0	71.8	8.4	19.2	3.3	76.9	216.2	.0	.0	120.4
Total	74,447.8	8,979.5	5,000.9	6,218.2	16,786.2	7,825.5	.0	601.0	993.9	1,173.0	7,272.0	4,226.5	1,948.5	340.7	5,601.8	1,062.5	219.5	200.2	5,997.9

Table 3.26—*Net volume of hardwood sawtimber on commercial timberland in the eastern United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section, region and diameter class	Total hardwoods	Hardwoods																	
		Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hick-ory	Yellow birch	Hard maple	Soft maple	Beech	Sweet-gum	Tupelo and black gum	Ash	Bass-wood	Yellow-poplar	Cotton-wood and aspen	Black walnut	Black cherry	Other eastern hardwoods
West Gulf:																			
11.0 to 12.9	12,379.2	1,173.4	563.1	1,501.7	2,809.9	1,162.5	.0	20.4	89.4	129.6	2,185.9	773.6	406.1	11.0	13.2	97.2	36.2	28.1	1,377.9
13.0 to 14.9	13,502.5	1,200.2	665.9	1,427.6	3,169.6	1,163.7	.0	15.2	112.0	162.6	2,212.8	1,138.3	456.9	9.3	26.7	149.3	9.0	16.9	1,566.5
15.9 to 16.9	11,678.8	993.3	630.8	1,152.2	2,753.1	913.5	.0	10.5	91.3	196.0	1,848.2	1,056.0	398.2	11.2	23.0	176.8	17.4	14.5	1,392.8
17.0 to 18.9	8,649.0	623.1	505.5	849.6	2,091.2	656.9	.0	7.7	55.6	136.4	1,328.3	742.1	346.6	18.0	20.0	204.7	10.4	4.3	1,048.6
19.0 to 20.9	6,053.5	385.5	404.3	668.6	1,529.0	417.4	.0	4.2	25.7	180.6	734.5	545.3	236.0	.0	10.6	148.1	6.0	2.7	755.0
21.0 to 28.9	9,664.1	490.3	698.2	1,067.6	2,641.1	1,068.1	.0	1.4	41.9	194.0	978.7	630.7	353.1	21.5	15.4	217.6	.0	4.6	1,239.9
29.0+	1,827.0	77.1	145.1	149.5	527.5	377.3	.0	.0	4.6	17.8	107.0	100.9	29.2	.0	5.5	168.3	.0	.0	117.2
Total	63,754.1	4,942.9	3,612.9	6,816.8	15,521.4	5,759.4	.0	59.4	420.5	1,017.0	9,395.4	4,986.9	2,226.1	71.0	114.4	1,162.0	79.0	71.1	7,497.9
Total, South:																			
11.0 to 12.9	56,004.4	5,872.3	2,246.7	5,022.5	10,793.3	4,932.1	5.3	281.3	1,912.1	568.6	7,504.2	5,346.5	1,420.6	236.8	4,692.2	174.1	198.8	142.6	4,654.4
13.0 to 14.9	59,049.8	6,275.9	2,598.2	5,284.9	11,611.5	4,985.1	26.1	315.2	1,717.3	709.1	7,417.3	6,112.6	1,619.1	219.7	5,090.3	274.7	151.4	144.7	4,496.7
15.0 to 16.9	50,429.9	5,342.5	2,557.0	4,267.9	10,045.3	3,929.6	31.0	222.5	1,488.2	714.3	5,974:5	5,094.8	1,421.1	223.8	4,708.4	330.6	95.3	89.3	3,893.8
17.0 to 18.9	36,928.3	3,775.5	2,122.1	3,039.2	7,732.5	2,804.0	11.4	173.6	1,078.0	636.8	4,086.3	3,555.4	1,047.6	158.9	3,360.3	319.2	56.8	59.6	2,911.1
19.0 to 20.9	24,565.4	2,370.0	1,749.3	2,301.8	5,173.6	1,673.5	10.7	141.3	699.2	580.9	2,466.0	2,192.1	690.4	69.3	2,168.9	280.6	39.9	20.4	1,937.5
21.0 to 28.9	38,787.7	3,442.9	3,512.5	4,042.0	8,851.9	3,009.8	32.9	190.0	1,019.0	908.5	3,238.2	2,742.6	951.7	154.3	2,941.5	733.9	9.5	25.5	2,981.0
29.0+	7,920.5	650.7	883.9	1,101.0	2,245.6	606.1	.0	25.6	119.9	115.4	387.7	383.6	92.8	15.1	397.6	434.0	6.7	.0	454.8
Total	273,686.0	27,729.8	15,669.7	25,059.3	56,453.7	21,940.2	117.4	1,349.5	8,033.7	4,233.6	31,074.2	25,427.6	7,243.3	1,077.9	23,359.2	2,547.1	558.4	482.1	21,329.3
Total, eastern regions:																			
11.0 to 12.9	128,265.1	12,555.6	8,973.8	8,452.9	16,866.3	8,547.6	1,865.1	7,170.4	8,720.1	3,210.8	7,871.1	5,681.2	5,069.2	2,377.9	6,762.5	8,656.4	643.7	2,112.4	12,728.1
13.0 to 14.9	120,496.9	12,682.5	9,228.8	8,428.8	17,704.9	7,995.0	1,743.6	6,677.1	6,923.6	3,389.9	7,734.5	6,428.7	4,300.2	1,892.8	7,608.8	4,896.2	626.5	1,916.5	10,318.5
15.0 to 16.9	95,823.0	10,298.7	8,151.9	6,478.7	15,088.6	6,013.0	1,362.6	5,111.1	4,728.6	3,158.5	6,234.7	5,400.4	3,277.0	1,461.2	6,849.1	2,475.2	439.5	1,251.2	8,043.0
17.0 to 18.9	67,627.6	7,131.9	6,342.8	4,588.9	11,307.0	4,098.8	945.2	3,814.1	3,029.5	2,317.7	4,246.6	3,787.0	2,046.0	853.8	4,970.4	1,378.6	231.6	756.6	5,781.1
19.0 to 20.9	44,204.8	4,447.2	4,860.4	3,197.8	7,533.2	2,459.1	668.3	2,351.4	1,846.1	1,695.2	2,568.3	2,332.4	1,212.9	574.3	3,134.8	876.4	163.2	430.6	3,853.2
21.0 to 28.9	67,066.7	6,580.8	8,198.0	5,203.0	12,223.3	3,855.6	914.3	3,341.5	2,662.1	2,644.7	3,402.1	2,921.1	1,721.2	686.2	4,222.3	2,004.1	94.0	377.8	6,014.6
29.0+	12,719.0	1,289.1	1,604.3	1,362.5	2,805.2	676.2	129.1	326.4	513.8	363.4	404.0	387.9	174.1	52.0	562.9	752.1	6.7	16.6	1,292.7
Total	536,203.0	54,985.8	47,360.0	37,712.6	83,528.5	33,645.3	7,628.2	28,792.0	28,423.8	16,780.2	32,461.3	26,938.7	17,800.6	7,898.2	34,110.8	21,039.0	2,205.2	6,861.7	48,031.2

Table 3.27—*Net volume of growing stock on commercial timberland in the western United States, by species, diameter class, section, and region, January 1, 1977*

[Million cubic feet]

Section, region and diameter class	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True fir	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense cedar	Lodgepole pine	Other western softwoods	Hardwoods: Total hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Pacific Northwest:																					
Douglas-fir subregion (Western Oregon and western Washington):																					
5.0 to 6.9	3,691.0	2,517.0	1,106.0	9.0	289.0	840.0	8.0	12.0	.0	27.0	2.0	.0	138.0	13.0	48.0	25.0	1,174.0	4.0	794.0	37.0	339.0
7.0 to 8.9	5,141.0	3,694.0	1,714.0	13.0	420.0	1,184.0	4.0	16.0	.0	39.0	3.0	1.0	195.0	16.0	61.0	28.0	1,447.0	7.0	1,001.0	57.0	382.0
9.0 to 10.9	6,134.0	4,565.0	2,090.0	20.0	490.0	1,552.0	7.0	29.0	1.0	46.0	5.0	2.0	199.0	16.0	86.0	22.0	1,569.0	9.0	1,096.0	80.0	384.0
11.0 to 12.9	6,790.0	5,295.0	2,611.0	25.0	568.0	1,635.0	13.0	30.0	.0	68.0	7.0	.0	223.0	16.0	73.0	26.0	1,495.0	16.0	1,035.0	63.0	381.0
13.0 to 14.9	6,782.0	5,503.0	2,756.0	26.0	605.0	1,706.0	16.0	38.0	2.0	35.0	7.0	1.0	200.0	28.0	57.0	26.0	1,279.0	18.0	925.0	33.0	303.0
15.0 to 16.9	6,620.0	5,664.0	2,873.0	48.0	665.0	1,685.0	13.0	30.0	2.0	55.0	11.0	3.0	199.0	22.0	35.0	23.0	956.0	28.0	671.0	26.0	231.0
17.0 to 18.9	6,462.0	5,714.0	2,994.0	33.0	653.0	1,570.0	14.0	39.0	3.0	63.0	10.0	6.0	246.0	38.0	17.0	28.0	748.0	33.0	473.0	22.0	220.0
19.0 to 20.9	5,880.0	5,379.0	2,774.0	39.0	642.0	1,515.0	27.0	44.0	3.0	36.0	10.0	3.0	226.0	25.0	12.0	23.0	501.0	26.0	277.0	14.0	184.0
21.0 to 28.9	19,620.0	18,720.0	9,665.0	145.0	2,323.0	5,109.0	111.0	157.0	10.0	176.0	28.0	12.0	775.0	113.0	9.0	87.0	900.0	50.0	475.0	37.0	338.0
29.0+	36,891.0	36,634.0	22,707.0	314.0	3,256.0	6,388.0	483.0	152.0	70.0	657.0	13.0	8.0	2,182.0	262.0	.0	142.0	257.0	55.0	35.0	4.0	163.0
Total	104,011.0	93,685.0	51,290.0	672.0	9,911.0	23,184.0	696.0	547.0	91.0	1,202.0	96.0	36.0	4,583.0	549.0	398.0	430.0	10,326.0	246.0	6,782.0	373.0	2,925.0
Pine subregion (Eastern Oregon and eastern Washington):																					
5.0 to 6.9	3,329.0	3,304.0	524.0	552.0	559.0	34.0	2.0	12.0	.0	.0	56.0	167.0	19.0	3.0	1,370.0	6.0	25.0	9.0	1.0	1.0	14.0
7.0 to 8.9	3,569.0	3,541.0	700.0	620.0	652.0	58.0	3.0	19.0	.0	.0	73.0	235.0	25.0	5.0	1,145.0	6.0	28.0	8.0	2.0	.0	18.0
9.0 to 10.9	3,695.0	3,670.0	817.0	664.0	702.0	71.0	3.0	34.0	.0	.0	103.0	243.0	23.0	4.0	998.0	8.0	25.0	16.0	.0	.0	9.0
11.0 to 12.9	3,530.0	3,505.0	802.0	701.0	701.0	94.0	3.0	40.0	.0	.0	117.0	281.0	23.0	4.0	733.0	6.0	25.0	17.0	1.0	1.0	6.0
13.0 to 14.9	3,236.0	3,216.0	812.0	758.0	664.0	106.0	2.0	36.0	.0	.0	114.0	257.0	20.0	2.0	439.0	6.0	20.0	16.0	1.0	1.0	2.0
15.0 to 16.9	3,033.0	3,018.0	744.0	809.0	637.0	120.0	7.0	39.0	.0	.0	127.0	238.0	18.0	7.0	267.0	5.0	15.0	14.0	.0	.0	1.0
17.0 to 18.9	2,793.0	2,779.0	701.0	843.0	587.0	108.0	5.0	30.0	.0	.0	121.0	215.0	16.0	6.0	141.0	6.0	14.0	13.0	.0	.0	1.0
19.0 to 20.9	2,490.0	2,480.0	613.0	864.0	496.0	98.0	5.0	25.0	.0	.0	96.0	171.0	13.0	6.0	89.0	4.0	10.0	9.0	.0	.0	1.0
21.0 to 28.9	7,603.0	7,579.0	1,785.0	3,260.0	1,275.0	274.0	14.0	68.0	.0	.0	264.0	484.0	37.0	36.0	64.0	18.0	24.0	19.0	2.0	.0	3.0
29.0+	5,768.0	5,758.0	1,454.0	2,890.0	767.0	160.0	21.0	38.0	.0	.0	106.0	241.0	43.0	26.0	4.0	8.0	10.0	8.0	.0	.0	2.0
Total	39,046.0	38,850.0	8,952.0	11,961.0	7,040.0	1,123.0	65.0	341.0	.0	.0	1,177.0	2,532.0	237.0	99.0	5,250.0	73.0	196.0	129.0	7.0	3.0	57.0
Coastal Alaska:																					
5.0 to 6.9	641.2	606.9	.0	.0	2.3	510.6	.0	.0	.0	39.8	.0	.0	15.6	.0	1.2	37.4	34.3	11.7	22.6	.0	.0
7.0 to 8.9	885.3	861.3	.0	.0	6.7	658.4	.0	.0	.0	98.1	.0	.0	27.0	.0	.1	71.0	24.0	12.8	11.2	.0	.0
9.0 to 10.9	1,367.0	1,324.0	.0	.0	5.2	947.6	.0	.0	.0	146.6	.0	.0	71.8	.0	2.0	150.8	43.0	28.8	14.2	.0	.0
11.0 to 12.9	1,923.2	1,886.3	.0	.0	3.8	1,432.7	.0	.0	.0	217.2	.0	.0	69.0	.0	.0	163.6	36.9	22.0	14.9	.0	.0
13.0 to 14.9	2,337.6	2,283.5	.0	.0	1.3	1,641.9	.0	.0	.0	332.3	.0	.0	95.8	.0	1.1	211.1	54.1	26.9	27.2	.0	.0
15.0 to 16.9	2,673.3	2,635.4	.0	.0	7.5	1,887.2	.0	.0	.0	352.2	.0	.0	137.4	.0	11.8	239.3	37.9	23.3	14.6	.0	.0
17.0 to 18.9	2,882.2	2,843.6	.0	.0	5.7	2,035.4	.0	.0	.0	405.2	.0	.0	147.3	.0	15.4	234.6	38.6	24.7	13.9	.0	.0
19.0 to 20.9	3,022.9	3,007.9	.0	.0	6.4	2,120.2	.0	.0	.0	488.8	.0	.0	151.0	.0	6.9	234.6	15.0	11.0	4.0	.0	.0
21.0 to 28.9	10,843.5	10,802.4	.0	.0	59.5	7,522.6	.0	.0	.0	2,160.5	.0	.0	502.0	.0	9.2	548.6	41.1	40.1	1.0	.0	.0
29.0+	11,997.3	11,937.6	.0	.0	52.3	6,703.1	.0	.0	.0	4,594.4	.0	.0	402.4	.0	.0	185.4	59.7	58.8	.9	.0	.0
Total	38,573.5	38,188.9	.0	.0	150.7	25,459.7	.0	.0	.0	8,835.1	.0	.0	1,619.3	.0	47.7	2,076.4	384.6	260.1	124.5	.0	.0

Table 3.27—*Net volume of growing stock on commercial timberland in the western United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million cubic feet]

Section, region and diameter class	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True fir	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense cedar	Lodgepole pine	Other western softwoods	Hardwoods: Total hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Interior Alaska:																					
5.0 to 6.9	625.6	224.4	.0	.0	.0	.0	.0	.0	.0	.0	224.4	.0	.0	.0	.0	.0	401.2	158.4	.0	.0	242.8
7.0 to 8.9	861.6	402.2	.0	.0	.0	.0	.0	.0	.0	.0	402.2	.0	.0	.0	.0	.0	459.4	145.1	.0	.0	314.3
9.0 to 10.9	926.0	540.6	.0	.0	.0	.0	.0	.0	.0	.0	540.6	.0	.0	.0	.0	.0	385.4	92.1	.0	.0	293.3
11.0 to 12.9	712.7	449.9	.0	.0	.0	.0	.0	.0	.0	.0	449.9	.0	.0	.0	.0	.0	262.8	70.0	.0	.0	192.8
13.0 to 14.9	542.1	359.0	.0	.0	.0	.0	.0	.0	.0	.0	359.0	.0	.0	.0	.0	.0	183.1	55.2	.0	.0	127.9
15.0 to 16.9	313.0	225.8	.0	.0	.0	.0	.0	.0	.0	.0	225.8	.0	.0	.0	.0	.0	87.2	38.4	.0	.0	48.8
17.0 to 18.9	161.7	115.2	.0	.0	.0	.0	.0	.0	.0	.0	115.2	.0	.0	.0	.0	.0	46.5	28.6	.0	.0	17.9
19.0 to 20.9	117.7	59.0	.0	.0	.0	.0	.0	.0	.0	.0	59.0	.0	.0	.0	.0	.0	58.7	53.1	.0	.0	5.6
21.0 to 28.9	169.9	45.4	.0	.0	.0	.0	.0	.0	.0	.0	45.4	.0	.0	.0	.0	.0	124.5	122.0	.0	.0	2.5
29.0+	68.9	9.5	.0	.0	.0	.0	.0	.0	.0	.0	9.5	.0	.0	.0	.0	.0	59.4	59.4	.0	.0	.0
Total	4,499.2	2,431.0	.0	.0	.0	.0	.0	.0	.0	.0	2,431.0	.0	.0	.0	.0	.0	2,068.2	822.3	.0	.0	1,245.9
Total, Pacific Northwest:																					
5.0 to 6.9	8,286.8	6,652.3	1,630.0	561.0	850.3	1,384.6	10.0	24.0	.0	66.8	282.4	167.0	172.6	16.0	1,419.2	68.4	1,634.5	183.1	817.6	38.0	595.8
7.0 to 8.9	10,456.9	8,498.5	2,414.0	633.0	1,078.7	1,900.4	7.0	35.0	.0	137.1	478.2	236.0	247.0	21.0	1,206.1	105.0	1,958.4	172.9	1,014.2	57.0	714.3
9.0 to 10.9	12,122.0	10,099.6	2,907.0	684.0	1,197.2	2,570.6	10.0	63.0	1.0	192.6	648.6	245.0	293.8	20.0	1,086.0	180.8	2,022.4	145.9	1,110.2	80.0	686.3
11.0 to 12.9	12,955.9	11,136.2	3,413.0	726.0	1,272.8	3,161.7	16.0	70.0	.0	285.2	573.9	281.0	315.0	20.0	806.0	195.6	1,819.7	125.0	1,050.9	64.0	579.8
13.0 to 14.9	12,897.7	11,361.5	3,568.0	784.0	1,270.3	3,453.9	18.0	74.0	2.0	367.3	480.0	258.0	315.8	30.0	497.1	243.1	1,536.2	116.1	953.2	34.0	432.9
15.0 to 16.9	12,639.3	11,543.2	3,617.0	857.0	1,309.5	3,692.2	20.0	69.0	2.0	407.2	363.8	241.0	354.4	29.0	313.8	267.3	1,096.1	103.7	685.6	26.0	280.8
17.0 to 18.9	12,298.9	11,451.8	3,695.0	876.0	1,245.7	3,713.4	19.0	69.0	3.0	468.2	246.2	221.0	409.3	44.0	173.4	268.6	847.1	99.3	486.9	22.0	238.9
19.0 to 20.9	11,510.6	10,925.9	3,387.0	903.0	1,144.4	3,733.2	32.0	69.0	3.0	524.8	165.0	174.0	390.0	31.0	107.9	261.6	584.7	99.1	281.0	14.0	190.6
21.0 to 28.9	38,236.4	37,146.8	11,450.0	3,405.0	3,657.5	12,905.6	125.0	225.0	10.0	2,336.5	337.4	496.0	1,314.0	149.0	82.2	653.6	1,089.6	231.1	478.0	37.0	343.5
29.0+	54,725.2	54,339.1	24,161.0	3,204.0	4,075.3	13,251.1	504.0	190.0	70.0	5,251.4	128.5	249.0	2,627.4	288.0	4.0	335.4	386.1	181.2	35.9	4.0	165.0
Total	186,129.7	173,154.9	60,242.0	12,633.0	17,101.7	49,766.7	761.0	888.0	91.0	10,037.1	3,704.0	2,568.0	6,439.3	648.0	5,695.7	2,579.4	12,974.8	1,457.4	6,913.5	376.0	4,227.9
Pacific Southwest:																					
5.0 to 6.9	1,023.0	769.0	202.0	149.0	258.0	3.0	21.0	2.0	28.0	.0	.0	.0	.0	70.0	24.0	12.0	254.0	.0	3.0	132.0	119.0
7.0 to 8.9	1,670.0	1,259.0	335.0	237.0	415.0	2.0	49.0	4.0	56.0	.0	.0	.0	1.0	103.0	49.0	8.0	411.0	2.0	8.0	199.0	202.0
9.0 to 10.9	2,028.0	1,613.0	374.0	334.0	556.0	8.0	52.0	5.0	90.0	4.0	1.0	.0	.0	106.0	63.0	20.0	415.0	4.0	8.0	201.0	202.0
11.0 to 12.9	2,276.0	1,885.0	437.0	386.0	641.0	6.0	66.0	9.0	132.0	.0	1.0	.0	.0	110.0	76.0	21.0	391.0	3.0	6.0	175.0	207.0
13.0 to 14.9	2,581.0	2,213.0	500.0	515.0	705.0	9.0	68.0	10.0	172.0	.0	1.0	.0	.0	138.0	72.0	23.0	368.0	4.0	7.0	166.0	191.0
15.0 to 16.9	2,752.0	2,387.0	595.0	486.0	721.0	6.0	84.0	11.0	243.0	4.0	.0	.0	.0	129.0	82.0	26.0	365.0	3.0	9.0	142.0	211.0
17.0 to 18.9	2,755.0	2,456.0	582.0	498.0	782.0	11.0	105.0	16.0	254.0	5.0	.0	.0	.0	122.0	66.0	15.0	299.0	3.0	6.0	125.0	165.0
19.0 to 20.9	2,777.0	2,511.0	588.0	541.0	745.0	7.0	115.0	14.0	274.0	8.0	1.0	.0	2.0	127.0	74.0	15.0	266.0	.0	5.0	108.0	153.0
21.0 to 28.9	10,736.0	10,016.0	2,285.0	2,318.0	3,012.0	39.0	629.0	70.0	953.0	19.0	2.0	.0	4.0	411.0	220.0	54.0	720.0	1.0	7.0	362.0	350.0
29.0+	21,272.0	20,870.0	6,888.0	3,660.0	4,969.0	38.0	2,166.0	90.0	2,100.0	8.0	1.0	.0	11.0	688.0	144.0	107.0	402.0	1.0	5.0	186.0	210.0
Total	49,870.0	45,979.0	12,786.0	9,124.0	12,804.0	129.0	3,355.0	231.0	4,302.0	48.0	7.0	.0	18.0	2,004.0	870.0	301.0	3,891.0	21.0	64.0	1,796.0	2,010.0

Table 3.27—*Net volume of growing stock on commercial timberland in the western United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million cubic feet]

Section, region and diameter class	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True fir	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense cedar	Lodgepole pine	Other western softwoods	Hardwoods: Total hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Total, Pacific Coast:																					
5.0 to 6.9	9,309.8	7,421.3	1,832.0	710.0	1,108.3	1,387.6	31.0	26.0	28.0	66.8	282.4	167.0	172.6	86.0	1,443.2	80.4	1,888.5	183.1	820.6	170.0	714.8
7.0 to 8.9	12,126.9	9,757.5	2,749.0	870.0	1,493.7	1,902.4	56.0	39.0	56.0	137.1	478.2	236.0	248.0	124.0	1,255.1	113.0	2,369.4	174.9	1,022.2	256.0	916.3
9.0 to 10.9	14,150.0	11,712.6	3,281.0	1,018.0	1,753.2	2,578.6	62.0	68.0	91.0	196.6	649.6	245.0	293.8	126.0	1,149.0	200.8	2,437.4	149.9	1,118.2	281.0	888.3
11.0 to 12.9	15,231.9	13,021.2	3,850.0	1,112.0	1,913.8	3,167.7	82.0	79.0	132.0	285.2	574.9	281.0	315.0	130.0	882.0	216.6	2,210.7	128.0	1,056.9	239.0	786.8
13.0 to 14.9	15,478.7	13,574.5	4,068.0	1,299.0	1,975.3	3,462.9	86.0	84.0	174.0	367.3	481.0	258.0	315.8	168.0	569.1	266.1	1,904.2	120.1	960.2	200.0	623.9
15.0 to 16.9	15,391.3	13,930.2	4,212.0	1,343.0	2,030.5	3,698.2	104.0	80.0	245.0	411.2	363.8	241.0	354.4	158.0	395.8	293.3	1,461.1	106.7	694.6	168.0	491.8
17.0 to 18.9	15,053.9	13,907.8	4,277.0	1,374.0	2,027.7	3,724.4	124.0	85.0	257.0	473.2	246.2	221.0	409.3	166.0	239.4	283.6	1,146.1	102.3	492.9	147.0	403.9
19.0 to 20.9	14,287.6	13,436.9	3,975.0	1,444.0	1,889.4	3,740.2	147.0	83.0	277.0	532.8	166.0	174.0	392.0	158.0	181.9	276.6	850.7	99.1	286.0	122.0	343.6
21.0 to 28.9	48,972.4	47,162.8	13,735.0	5,723.0	6,669.5	12,944.6	754.0	295.0	963.0	2,355.5	339.4	496.0	1,318.0	560.0	302.2	707.6	1,809.6	232.1	485.0	399.0	693.5
29.0+	75,997.2	75,209.1	31,049.0	6,864.0	9,044.3	13,289.1	2,670.0	280.0	2,170.0	5,259.4	129.5	249.0	2,638.4	976.0	148.0	442.4	788.1	182.2	40.9	190.0	375.0
Total	235,999.7	219,133.9	73,028.0	21,757.0	29,905.7	49,895.7	4,116.0	1,119.0	4,393.0	10,085.1	3,711.0	2,568.0	6,457.3	2,652.0	6,565.7	2,880.4	16,865.8	1,478.4	6,977.5	2,172.0	6,237.9
Northern Rocky Mtn.:																					
5.0 to 6.9	6,768.3	6,638.1	1,057.2	349.2	910.0	68.2	.0	57.6	.0	.0	264.3	275.1	121.8	.0	3,370.7	164.0	130.2	90.4	.0	.0	39.8
7.0 to 8.9	9,372.2	9,241.9	1,542.4	597.2	1,226.3	141.9	.0	129.9	.0	.0	417.6	372.8	167.7	.0	4,282.1	364.0	130.3	103.7	.0	.0	26.6
9.0 to 10.9	9,394.3	9,279.4	1,887.4	796.0	1,339.3	160.1	.0	161.2	.0	.0	524.9	429.1	203.3	.0	3,552.6	225.5	114.9	94.2	.0	.0	20.7
11.0 to 12.9	8,365.4	8,271.9	1,993.3	899.7	1,181.9	164.1	.0	224.1	.0	.0	640.8	410.5	216.4	.0	2,318.1	223.0	93.5	85.4	.0	.0	8.1
13.0 to 14.9	7,213.2	7,140.2	2,121.3	849.3	1,068.1	169.9	.0	194.2	.0	.0	669.7	400.9	221.1	.0	1,277.8	167.9	73.0	65.1	.0	.0	7.9
15.0 to 16.9	5,767.8	5,715.0	1,817.8	733.5	884.1	155.9	.0	208.5	.0	.0	670.4	351.5	180.0	.0	596.5	116.8	52.8	51.3	.0	.0	1.5
17.0 to 18.9	4,736.9	4,695.8	1,562.4	580.9	748.6	136.6	.0	215.8	.0	.0	593.9	321.5	175.8	.0	291.4	68.9	41.1	39.9	.0	.0	1.2
19.0 to 20.9	3,855.6	3,827.5	1,331.1	473.4	545.1	106.1	.0	209.4	.0	.0	521.1	282.9	181.4	.0	130.7	46.3	28.1	27.0	.0	.0	1.1
21.0 to 28.9	8,867.4	8,789.6	2,907.7	1,305.4	1,268.9	251.7	.0	539.4	.0	.0	1,198.6	724.5	448.1	.0	84.3	61.0	77.8	76.3	.0	.0	1.5
29.0+	4,357.4	4,342.3	1,067.3	1,249.3	586.5	102.8	.0	231.8	.0	.0	392.0	307.2	390.1	.0	4.0	11.3	15.1	9.8	.0	.0	5.3
Total	68,698.5	67,941.7	17,287.9	7,833.9	9,758.8	1,457.3	.0	2,171.9	.0	.0	5,893.3	3,876.0	2,305.7	.0	15,908.2	1,448.7	756.8	643.1	.0	.0	113.7
Southern Rocky Mtn.:																					
5.0 to 6.9	3,551.0	2,877.4	384.9	365.3	592.4	.0	.0	.1	.0	.0	538.1	.0	.0	.1	936.0	60.5	673.6	673.6	.0	.0	.0
7.0 to 8.9	3,807.8	2,770.5	300.7	443.9	532.0	.1	.0	.2	.0	.0	607.1	.0	.0	.0	833.5	53.0	1,037.3	1,037.0	.0	.0	.3
9.0 to 10.9	3,788.8	2,894.3	283.2	510.3	540.0	.1	.0	.1	.0	.0	771.5	.0	.0	.0	745.9	43.2	894.5	894.0	.0	.0	.5
11.0 to 12.9	3,603.2	2,957.7	295.3	665.8	471.0	.1	.0	.3	.0	.0	875.7	.0	.0	.1	590.5	58.9	645.5	645.1	.0	.0	.4
13.0 to 14.9	3,164.9	2,775.3	318.6	729.7	396.0	.1	.1	.5	.0	.0	858.7	.0	.0	.0	423.9	47.7	389.6	389.6	.0	.0	.0
15.0 to 16.9	2,857.3	2,632.3	321.6	880.6	331.8	.2	.0	.4	.0	.0	839.4	.0	.0	.0	216.2	42.1	225.0	225.0	.0	.0	.0
17.0 to 18.9	2,470.2	2,336.1	283.1	908.5	272.5	.4	.0	.4	.0	.0	731.5	.0	.0	.1	112.3	27.3	134.1	134.1	.0	.0	.0
19.0 to 20.9	1,995.4	1,928.4	251.1	858.5	182.7	.2	.1	.7	.0	.0	561.1	.0	.0	.1	51.5	22.4	67.0	67.0	.0	.0	.0
21.0 to 28.9	4,638.9	4,583.2	514.5	2,496.5	360.3	1.9	.0	3.6	.0	.0	1,124.5	.0	.0	.3	34.6	47.0	55.7	55.7	.0	.0	.0
29.0+	1,238.0	1,237.9	232.7	633.0	153.1	1.6	.8	6.0	.0	.0	192.7	.0	.0	.5	3.2	14.3	.1	.1	.0	.0	.0
Total	31,115.5	26,993.1	3,185.7	8,492.1	3,831.8	4.7	1.0	12.3	.0	.0	7,100.3	.0	.0	1.2	3,947.6	416.4	4,122.4	4,121.2	.0	.0	1.2

Table 3.27—*Net volume of growing stock on commercial timberland in the western United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million cubic feet]

Section, region and diameter class	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True fir	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense cedar	Lodgepole pine	Other western softwoods	Hardwoods: Total hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Total, Rocky Mtn.:																					
5.0 to 6.9	10,319.3	9,515.5	1,442.1	714.5	1,502.4	68.2	.0	57.7	.0	.0	802.4	275.1	121.8	.1	4,306.7	224.5	803.8	764.0	.0	.0	39.8
7.0 to 8.9	13,180.0	12,012.4	1,843.1	1,041.1	1,758.3	142.0	.0	130.1	.0	.0	1,024.7	372.8	167.7	.0	5,115.6	417.0	1,167.6	1,140.7	.0	.0	26.9
9.0 to 10.9	13,183.1	12,173.7	2,170.6	1,306.3	1,879.3	160.2	.0	161.3	.0	.0	1,296.4	429.1	203.3	.0	4,298.5	268.7	1,009.4	988.2	.0	.0	21.2
11.0 to 12.9	11,968.6	11,229.6	2,288.6	1,565.5	1,652.9	164.2	.0	224.4	.0	.0	1,516.5	410.5	216.4	.1	2,908.6	281.9	739.0	730.5	.0	.0	8.5
13.0 to 14.9	10,378.1	9,915.5	2,439.9	1,579.0	1,464.1	170.0	.1	194.7	.0	.0	1,528.4	400.9	221.1	.0	1,701.7	215.6	462.6	454.7	.0	.0	7.9
15.0 to 16.9	8,625.1	8,347.3	2,139.4	1,614.1	1,215.9	156.1	.0	208.9	.0	.0	1,509.8	351.5	180.0	.0	812.7	158.9	277.8	276.3	.0	.0	1.5
17.0 to 18.9	7,207.1	7,031.9	1,845.5	1,489.4	1,021.1	137.0	.0	216.2	.0	.0	1,325.4	321.5	175.8	.1	403.7	96.2	175.2	174.0	.0	.0	1.2
19.0 to 20.9	5,851.0	5,755.9	1,582.2	1,331.9	727.8	106.3	.1	210.1	.0	.0	1,082.2	282.9	181.4	.1	182.2	68.7	95.1	94.0	.0	.0	1.1
21.0 to 28.9	13,506.3	13,372.8	3,422.2	3,801.9	1,629.2	253.6	.0	543.0	.0	.0	2,323.1	724.5	448.1	.3	118.9	108.0	133.5	132.0	.0	.0	1.5
29.0+	5,595.4	5,580.2	1,300.0	1,882.3	739.6	104.4	.8	237.8	.0	.0	584.7	307.2	390.1	.5	7.2	25.6	15.2	9.9	.0	.0	5.3
Total	99,814.0	94,934.8	20,473.6	16,326.0	13,590.6	1,462.0	1.0	2,184.2	.0	.0	12,993.6	3,876.0	2,305.7	1.2	19,855.8	1,865.1	4,879.2	4,764.3	.0	.0	114.9
Total, western regions:																					
5.0 to 6.9	19,629.1	16,936.8	3,274.1	1,424.5	2,610.7	1,455.8	31.0	83.7	28.0	66.8	1,084.8	442.1	294.4	86.1	5,749.9	304.9	2,692.3	947.1	820.6	170.0	754.6
7.0 to 8.9	25,306.9	21,769.9	4,592.1	1,911.1	3,252.0	2,044.4	56.0	169.1	56.0	137.1	1,502.9	608.8	415.7	124.0	6,370.7	530.0	3,537.0	1,315.6	1,022.2	256.0	943.2
9.0 to 10.9	27,333.1	23,886.3	5,451.6	2,324.3	3,632.5	2,738.8	62.0	229.3	91.0	196.6	1,946.0	674.1	497.1	126.0	5,447.5	469.5	3,446.8	1,138.1	1,118.2	281.0	909.5
11.0 to 12.9	27,200.5	24,250.8	6,138.6	2,677.5	3,566.7	3,331.9	82.0	303.4	132.0	285.2	2,091.4	691.5	531.4	130.1	3,790.6	498.5	2,949.7	858.5	1,056.9	239.0	795.3
13.0 to 14.9	25,856.8	23,490.0	6,507.9	2,878.0	3,439.4	3,632.9	86.1	278.7	174.0	367.3	2,009.4	658.9	536.9	168.0	2,270.8	481.7	2,366.8	574.8	960.2	200.0	631.8
15.0 to 16.9	24,016.4	22,277.5	6,351.4	2,957.1	3,246.4	3,854.3	104.0	288.9	245.0	411.2	1,873.6	592.5	534.4	158.0	1,208.5	452.2	1,738.9	383.0	694.6	168.0	493.3
17.0 to 18.9	22,261.0	20,939.7	6,122.5	2,863.4	3,048.8	3,861.4	124.0	301.2	257.0	473.2	1,571.6	542.5	585.1	166.1	643.1	379.8	1,321.3	276.3	492.9	147.0	405.1
19.0 to 20.9	20,138.6	19,192.8	5,557.2	2,775.9	2,617.2	3,846.5	147.1	293.1	277.0	532.8	1,248.2	456.9	573.4	158.1	364.1	345.3	945.8	193.1	286.0	122.0	344.7
21.0 to 28.9	62,478.7	60,535.6	17,157.2	9,524.9	8,298.7	13,198.2	754.0	838.0	963.0	2,355.5	2,662.5	1,220.5	1,766.1	560.3	421.1	815.6	1,943.1	364.1	485.0	399.0	695.0
29.0+	81,592.6	80,789.3	32,349.0	8,746.3	9,783.9	13,393.5	2,670.8	517.8	2,170.0	5,259.4	714.2	556.2	3,028.5	976.5	155.2	468.0	803.3	192.1	40.9	190.0	380.3
Total	335,813.7	314,068.7	93,501.6	38,083.0	43,496.3	51,357.7	4,117.0	3,303.2	4,393.0	10,085.1	16,704.6	6,444.0	8,763.0	2,653.2	26,421.5	4,745.5	21,745.0	6,242.7	6,977.5	2,172.0	6,352.8

Table 3.28—*Net volume of sawtimber on commercial timberland in the western United States, by species, diameter class, section, and region, January 1, 1977*

[Million board feet, International 1/4-inch log rule]

Section, region and diameter class	All species	Softwoods: Total softwoods	Softwoods: Douglas-fir	Softwoods: Ponderosa and Jeffrey pine	Softwoods: True fir	Softwoods: Western hemlock	Softwoods: Sugar pine	Softwoods: Western white pine	Softwoods: Redwood	Softwoods: Sitka spruce	Softwoods: Engelmann and other spruce	Softwoods: Western larch	Softwoods: Western redcedar	Softwoods: Incense cedar	Softwoods: Lodgepole pine	Softwoods: Other western softwoods	Hardwoods: Total hardwoods	Hardwoods: Cottonwood and aspen	Hardwoods: Red alder	Hardwoods: Oak	Hardwoods: Other western hardwoods
Pacific Northwest:																					
Douglas-fir subregion (Western Oregon and western Washington):																					
9.0 to 10.9	19,314.0	19,314.0	8,858.0	79.0	2,129.0	6,627.0	28.0	117.0	2.0	198.0	18.0	11.0	771.0	54.0	344.0	78.0	.0	.0	.0	.0	.0
11.0 to 12.9	31,697.0	25,054.0	12,441.0	104.0	2,686.0	7,836.0	50.0	130.0	.0	349.0	30.0	2.0	949.0	64.0	310.0	103.0	6,643.0	70.0	4,638.0	230.0	1,705.0
13.0 to 14.9	35,331.0	28,898.0	14,556.0	127.0	3,125.0	9,134.0	76.0	187.0	8.0	202.0	33.0	5.0	949.0	110.0	276.0	110.0	6,433.0	87.0	4,719.0	145.0	1,482.0
15.0 to 16.9	37,198.0	31,955.0	16,322.0	259.0	3,705.0	9,616.0	70.0	196.0	9.0	321.0	62.0	18.0	992.0	92.0	180.0	113.0	5,243.0	152.0	3,730.0	136.0	1,225.0
17.0 to 18.9	37,992.0	33,631.0	17,834.0	186.0	3,769.0	9,354.0	77.0	231.0	10.0	375.0	61.0	33.0	1,307.0	168.0	90.0	136.0	4,361.0	184.0	2,810.0	103.0	1,264.0
19.0 to 20.9	35,739.0	32,705.0	17,078.0	225.0	3,819.0	9,295.0	154.0	276.0	18.0	228.0	60.0	17.0	1,214.0	115.0	65.0	141.0	3,034.0	144.0	1,738.0	85.0	1,067.0
21.0 to 28.9	126,177.0	120,217.0	63,066.0	890.0	14,650.0	32,864.0	673.0	1,026.0	64.0	1,119.0	191.0	77.0	4,457.0	590.0	43.0	507.0	5,960.0	338.0	3,162.0	201.0	2,259.0
29.0+	256,108.0	254,280.0	159,019.0	2,003.0	22,958.0	44,090.0	3,132.0	1,052.0	462.0	4,746.0	83.0	47.0	14,259.0	1,483.0	.0	946.0	1,828.0	387.0	226.0	25.0	1,190.0
Total	579,556.0	546,054.0	309,174.0	3,873.0	56,841.0	128,816.0	4,260.0	3,215.0	573.0	7,538.0	538.0	210.0	24,898.0	2,676.0	1,308.0	2,134.0	33,502.0	1,362.0	21,023.0	925.0	10,192.0
Pine subregion (Eastern Oregon and eastern Washington):																					
9.0 to 10.9	15,967.0	15,967.0	3,455.0	2,871.0	3,074.0	305.0	12.0	159.0	.0	.0	438.0	1,079.0	97.0	18.0	4,425.0	34.0	.0	.0	.0	.0	.0
11.0 to 12.9	16,586.0	16,501.0	3,632.0	3,205.0	3,259.0	436.0	12.0	208.0	.0	.0	566.0	1,370.0	100.0	24.0	3,663.0	26.0	85.0	48.0	8.0	2.0	27.0
13.0 to 14.9	16,306.0	16,229.0	4,052.0	3,693.0	3,352.0	539.0	7.0	202.0	.0	.0	593.0	1,388.0	90.0	12.0	2,268.0	33.0	77.0	61.0	3.0	6.0	7.0
15.0 to 16.9	16,251.0	16,186.0	3,984.0	4,198.0	3,400.0	632.0	31.0	220.0	.0	.0	695.0	1,403.0	94.0	29.0	1,471.0	29.0	65.0	59.0	1.0	.0	5.0
17.0 to 18.9	15,736.0	15,681.0	3,979.0	4,655.0	3,268.0	604.0	24.0	180.0	.0	.0	699.0	1,329.0	84.0	28.0	800.0	31.0	55.0	49.0	.0	1.0	5.0
19.0 to 20.9	14,569.0	14,525.0	3,633.0	5,027.0	2,814.0	572.0	29.0	156.0	.0	.0	577.0	1,093.0	64.0	25.0	515.0	20.0	44.0	35.0	.0	1.0	8.0
21.0 to 28.9	47,494.0	47,388.0	11,218.0	20,792.0	7,501.0	1,706.0	81.0	436.0	.0	.0	1,692.0	3,125.0	200.0	159.0	374.0	104.0	106.0	87.0	3.0	.0	16.0
29.0+	39,003.0	38,955.0	9,827.0	20,326.0	4,573.0	1,101.0	129.0	279.0	.0	.0	718.0	1,539.0	259.0	127.0	27.0	50.0	48.0	34.0	.0	.0	14.0
Total	181,912.0	181,432.0	43,780.0	64,767.0	31,241.0	5,895.0	325.0	1,840.0	.0	.0	5,978.0	12,326.0	988.0	422.0	13,543.0	327.0	480.0	373.0	15.0	10.0	82.0
Coastal Alaska:																					
9.0 to 10.9	4,670.0	4,670.0	.0	.0	18.5	3,343.3	.0	.0	.0	517.5	.0	.0	253.3	.0	5.4	532.0	.0	.0	.0	.0	.0
11.0 to 12.9	7,453.6	7,305.0	.0	.0	14.8	5,548.3	.0	.0	.0	841.1	.0	.0	267.3	.0	.0	633.5	148.6	82.5	66.1	.0	.0
13.0 to 14.9	9,818.6	9,586.0	.0	.0	5.6	6,892.7	.0	.0	.0	1,394.9	.0	.0	402.1	.0	4.5	886.2	232.6	110.0	122.6	.0	.0
15.0 to 16.9	11,825.6	11,661.0	.0	.0	33.2	8,350.3	.0	.0	.0	1,558.6	.0	.0	608.0	.0	52.1	1,058.8	164.6	99.5	65.1	.0	.0
17.0 to 18.9	13,225.5	13,050.0	.0	.0	26.0	9,341.5	.0	.0	.0	1,859.5	.0	.0	675.8	.0	70.5	1,076.7	175.5	112.5	63.0	.0	.0
19.0 to 20.9	14,265.5	14,195.0	.0	.0	30.1	10,005.5	.0	.0	.0	2,306.9	.0	.0	712.8	.0	32.7	1,107.0	70.5	53.2	17.3	.0	.0
21.0 to 28.9	52,969.6	52,759.0	.0	.0	290.8	36,740.3	.0	.0	.0	10,551.8	.0	.0	2,451.8	.0	45.0	2,679.3	210.6	206.3	4.3	.0	.0
29.0+	61,731.1	61,378.0	.0	.0	268.7	34,464.4	.0	.0	.0	23,622.7	.0	.0	2,068.9	.0	.0	953.3	353.1	349.2	3.9	.0	.0
Total	175,959.5	174,604.0	.0	.0	687.7	114,686.3	.0	.0	.0	42,653.0	.0	.0	7,440.0	.0	210.2	8,926.8	1,355.5	1,013.2	342.3	.0	.0

Table 3.28—*Net volume of sawtimber on commercial timberland in the western United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section, region and diameter class	All species	Softwoods: Total soft-woods	Doug-las-fir	Ponder-osa and Jeffrey pine	True fir	West-ern hem-lock	Sugar pine	West-ern white pine	Red-wood	Sitka spruce	Engel-mann and other spruce	West-ern larch	West-ern red-cedar	In-cense cedar	Lodge-pole pine	Other west-ern soft-woods	Hardwoods: Total hard-woods	Cot-ton-wood and aspen	Red alder	Oak	Other west-ern hard-woods
Interior Alaska:																					
9.0 to 10.9	2,841.8	2,841.8	.0	.0	.0	.0	.0	.0	.0	.0	2,841.8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11.0 to 12.9	3,282.8	2,415.3	.0	.0	.0	.0	.0	.0	.0	.0	2,415.3	.0	.0	.0	.0	.0	867.5	231.3	.0	.0	636.2
13.0 to 14.9	2,639.4	1,985.5	.0	.0	.0	.0	.0	.0	.0	.0	1,985.5	.0	.0	.0	.0	.0	653.9	208.4	.0	.0	445.5
15.0 to 16.9	1,580.3	1,246.6	.0	.0	.0	.0	.0	.0	.0	.0	1,246.6	.0	.0	.0	.0	.0	333.7	155.7	.0	.0	178.0
17.0 to 18.9	836.6	650.8	.0	.0	.0	.0	.0	.0	.0	.0	650.8	.0	.0	.0	.0	.0	185.8	118.9	.0	.0	66.9
19.0 to 20.9	578.8	335.0	.0	.0	.0	.0	.0	.0	.0	.0	335.0	.0	.0	.0	.0	.0	243.8	215.1	.0	.0	28.7
21.0 to 28.9	835.3	290.0	.0	.0	.0	.0	.0	.0	.0	.0	290.0	.0	.0	.0	.0	.0	545.3	535.6	.0	.0	9.7
29.0+	303.0	36.8	.0	.0	.0	.0	.0	.0	.0	.0	36.8	.0	.0	.0	.0	.0	266.2	266.2	.0	.0	.0
Total	12,898.0	9,801.8	.0	.0	.0	.0	.0	.0	.0	.0	9,801.8	.0	.0	.0	.0	.0	3,096.2	1,731.2	.0	.0	1,365.0
Total, Pacific Northwest:																					
9.0 to 10.9	42,792.8	42,792.8	12,313.0	2,950.0	5,221.5	10,275.3	40.0	276.0	2.0	715.5	3,297.8	1,090.0	1,121.3	72.0	4,774.4	644.0	.0	.0	.0	.0	.0
11.0 to 12.9	59,019.4	51,275.3	16,073.0	3,309.0	5,959.8	13,820.3	62.0	338.0	.0	1,190.1	3,011.3	1,372.0	1,316.3	88.0	3,973.0	762.5	7,744.1	431.8	4,712.1	232.0	2,368.2
13.0 to 14.9	64,095.0	56,698.5	18,608.0	3,820.0	6,482.6	16,565.7	83.0	389.0	8.0	1,596.9	2,611.5	1,393.0	1,441.1	122.0	2,548.5	1,029.2	7,396.5	466.4	4,844.6	151.0	1,934.5
15.0 to 16.9	66,854.9	61,048.6	20,306.0	4,457.0	7,138.2	18,598.3	101.0	416.0	9.0	1,879.6	2,003.6	1,421.0	1,694.0	121.0	1,703.1	1,200.8	5,806.3	466.2	3,796.1	136.0	1,408.0
17.0 to 18.9	67,790.1	63,012.8	21,813.0	4,841.0	7,063.0	19,299.5	101.0	411.0	10.0	2,234.5	1,410.8	1,362.0	2,066.8	196.0	960.5	1,243.7	4,777.3	464.4	2,873.0	104.0	1,335.9
19.0 to 20.9	65,152.3	61,760.0	20,711.0	5,252.0	6,663.1	19,872.5	183.0	432.0	18.0	2,534.9	972.0	1,110.0	1,990.8	140.0	612.7	1,268.0	3,392.3	447.3	1,755.3	86.0	1,103.7
21.0 to 28.9	227,475.9	220,654.0	74,284.0	21,682.0	22,441.8	71,310.3	754.0	1,462.0	64.0	11,670.8	2,173.0	3,202.0	7,108.8	749.0	462.0	3,290.3	6,821.9	1,166.9	3,169.3	201.0	2,284.7
29.0+	357,145.1	354,649.8	168,846.0	22,329.0	27,799.7	79,655.4	3,261.0	1,331.0	462.0	28,368.7	837.8	1,586.0	16,586.9	1,610.0	27.0	1,949.3	2,495.3	1,036.4	229.9	25.0	1,204.0
Total	950,325.5	911,891.8	352,954.0	68,640.0	88,769.7	249,397.3	4,585.0	5,055.0	573.0	50,191.0	16,317.8	12,536.0	33,326.0	3,098.0	15,061.2	11,387.8	38,433.7	4,479.4	21,380.3	935.0	11,639.0
Pacific Southwest:																					
9.0 to 10.9	4,975.0	4,975.0	1,045.0	961.0	1,917.0	19.0	143.0	15.0	195.0	10.0	1.0	.0	.0	410.0	186.0	73.0	.0	.0	.0	.0	.0
11.0 to 12.9	8,176.0	7,199.0	1,466.0	1,413.0	2,841.0	18.0	289.0	29.0	306.0	.0	2.0	.0	.0	461.0	279.0	95.0	977.0	13.0	16.0	485.0	463.0
13.0 to 14.9	11,080.0	10,030.0	2,004.0	2,277.0	3,625.0	42.0	322.0	46.0	694.0	.0	2.0	.0	3.0	579.0	328.0	108.0	1,050.0	11.0	25.0	504.0	510.0
15.0 to 16.9	12,718.0	11,616.0	2,659.0	2,322.0	3,885.0	25.0	456.0	54.0	1,156.0	19.0	.0	.0	1.0	497.0	399.0	143.0	1,102.0	9.0	29.0	450.0	614.0
17.0 to 18.9	13,648.0	12,710.0	2,864.0	2,568.0	4,381.0	46.0	555.0	79.0	1,267.0	27.0	.0	.0	.0	499.0	335.0	89.0	938.0	7.0	24.0	412.0	495.0
19.0 to 20.9	14,666.0	13,696.0	3,111.0	2,971.0	4,292.0	37.0	682.0	73.0	1,418.0	42.0	.0	.0	6.0	570.0	404.0	90.0	970.0	2.0	23.0	389.0	556.0
21.0 to 28.9	60,495.0	57,931.0	12,827.0	13,616.0	18,069.0	204.0	3,724.0	403.0	5,041.0	114.0	2.0	.0	23.0	2,245.0	1,275.0	388.0	2,564.0	9.0	33.0	1,408.0	1,114.0
29.0+	138,958.0	137,454.0	46,962.0	25,172.0	32,941.0	236.0	14,239.0	546.0	11,357.0	56.0	2.0	.0	68.0	4,322.0	936.0	617.0	1,504.0	1.0	29.0	782.0	692.0
Total	264,716.0	255,611.0	72,938.0	51,300.0	71,951.0	627.0	20,410.0	1,245.0	21,434.0	268.0	9.0	.0	101.0	9,583.0	4,142.0	1,603.0	9,105.0	52.0	179.0	4,430.0	4,444.0

Table 3.28—*Net volume of sawtimber on commercial timberland in the western United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section, region and diameter class	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	True fir	Western hemlock	Sugar pine	Western white pine	Redwood	Sitka spruce	Engelmann and other spruce	Western larch	Western redcedar	Incense cedar	Lodgepole pine	Other western softwoods	Hardwoods: Total hardwoods	Cottonwood and aspen	Red alder	Oak	Other western hardwoods
Total, Pacific Coast:																					
9.0 to 10.9	47,767.8	47,767.8	13,358.0	3,911.0	7,138.5	10,294.3	183.0	291.0	197.0	725.5	3,298.8	1,090.0	1,121.3	482.0	4,960.4	717.0	.0	.0	.0	.0	.0
11.0 to 12.9	67,195.4	58,474.3	17,539.0	4,722.0	8,800.8	13,838.3	351.0	367.0	306.0	1,190.1	3,013.3	1,372.0	1,316.3	549.0	4,252.0	857.5	8,721.1	444.8	4,728.1	717.0	2,831.2
13.0 to 14.9	75,175.0	66,728.5	20,612.0	6,097.0	10,107.6	16,607.7	405.0	435.0	702.0	1,596.9	2,613.5	1,393.0	1,444.1	701.0	2,876.5	1,137.2	8,446.5	477.4	4,869.6	655.0	2,444.5
15.0 to 16.9	79,572.9	72,664.6	22,965.0	6,779.0	11,023.2	18,623.3	557.0	470.0	1,165.0	1,898.6	2,003.6	1,421.0	1,695.0	618.0	2,102.1	1,343.8	6,908.3	475.2	3,825.1	586.0	2,022.0
17.0 to 18.9	81,438.1	75,722.8	24,677.0	7,409.0	11,444.0	19,345.5	656.0	490.0	1,277.0	2,261.5	1,410.8	1,362.0	2,066.8	695.0	1,295.5	1,332.7	5,715.3	471.4	2,897.0	516.0	1,830.9
19.0 to 20.9	79,818.3	75,456.0	23,822.0	8,223.0	10,955.1	19,909.5	865.0	505.0	1,436.0	2,576.9	972.0	1,110.0	1,996.8	710.0	1,016.7	1,358.0	4,362.3	449.3	1,778.3	475.0	1,659.7
21.0 to 28.9	287,970.9	278,585.0	87,111.0	35,298.0	40,510.8	71,514.3	4,478.0	1,865.0	5,105.0	11,784.8	2,175.0	3,202.0	7,131.8	2,994.0	1,737.0	3,678.3	9,385.9	1,175.9	3,202.3	1,609.0	3,398.7
29.0+	496,103.1	492,103.8	215,808.0	47,501.0	60,740.7	79,891.4	17,500.0	1,877.0	11,819.0	28,424.7	839.8	1,586.0	16,654.9	5,932.0	963.0	2,566.3	3,999.3	1,037.4	258.9	807.0	1,896.0
Total	1,215,041.5	1,167,502.8	425,892.0	119,940.0	160,720.7	250,024.3	24,995.0	6,300.0	22,007.0	50,459.0	16,326.8	12,536.0	33,427.0	12,681.0	19,203.2	12,990.8	47,538.7	4,531.4	21,559.3	5,365.0	16,083.0
Northern Rocky Mtn.:																					
9.0 to 10.9	39,533.5	39,533.5	7,370.6	2,219.0	5,809.8	593.0	.0	791.6	.0	.0	2,490.9	2,210.0	898.5	.0	16,230.2	919.9	.0	.0	.0	.0	.0
11.0 to 12.9	41,222.4	40,727.7	9,253.0	3,639.7	5,957.4	761.2	.0	1,178.5	.0	.0	3,394.2	2,288.0	1,020.5	.0	12,132.0	1,103.2	494.7	447.6	.0	.0	47.1
13.0 to 14.9	36,731.4	36,316.8	10,444.5	4,142.1	5,496.9	844.9	.0	1,009.9	.0	.0	3,563.0	2,225.0	1,053.6	.0	6,704.1	832.8	414.6	373.5	.0	.0	41.1
15.0 to 16.9	30,016.1	29,725.8	9,261.2	3,866.3	4,580.8	841.2	.0	1,062.0	.0	.0	3,589.2	1,949.1	866.6	.0	3,127.6	581.8	290.3	283.2	.0	.0	7.1
17.0 to 18.9	25,174.0	24,958.0	8,207.5	3,245.2	3,982.3	761.7	.0	1,087.8	.0	.0	3,173.5	1,784.2	843.6	.0	1,525.9	346.3	216.0	210.5	.0	.0	5.5
19.0 to 20.9	20,813.6	20,663.8	7,165.2	2,775.6	2,906.8	612.3	.0	1,078.3	.0	.0	2,801.3	1,552.6	870.6	.0	675.5	225.6	149.8	144.6	.0	.0	5.2
21.0 to 28.9	50,143.0	49,722.6	16,391.2	7,495.0	7,235.2	1,647.3	.0	2,871.8	.0	.0	6,833.3	4,091.4	2,408.6	.0	432.9	315.9	420.4	410.5	.0	.0	9.9
29.0+	26,011.8	25,919.1	6,171.1	7,502.0	3,582.0	811.1	.0	1,326.6	.0	.0	2,311.9	1,685.3	2,452.6	.0	20.9	55.6	92.7	68.1	.0	.0	24.6
Total	269,645.8	267,567.3	74,264.3	34,884.9	39,551.2	6,872.7	.0	10,406.5	.0	.0	28,157.3	17,785.6	10,414.6	.0	40,849.1	4,381.1	2,078.5	1,938.0	.0	.0	140.5
Southern Rocky Mtn.:																					
9.0 to 10.9	14,043.6	14,043.6	1,508.2	1,234.5	2,737.6	.4	.0	.5	.0	.0	4,467.4	.0	.0	.2	3,826.7	268.1	.0	.0	.0	.0	.0
11.0 to 12.9	17,238.0	14,067.0	1,440.3	2,258.2	2,282.0	.5	.0	1.5	.0	.0	4,765.0	.0	.0	.1	3,033.4	286.0	3,171.0	3,169.3	.0	.0	1.7
13.0 to 14.9	16,043.0	14,072.9	1,732.9	3,048.8	2,031.0	.5	.3	2.4	.0	.0	4,770.6	.0	.0	.0	2,245.8	240.6	1,970.1	1,970.1	.0	.0	.0
15.0 to 16.9	14,964.7	13,783.1	1,811.5	4,081.9	1,766.8	1.0	.0	2.4	.0	.0	4,730.3	.0	.0	.2	1,168.1	220.9	1,181.6	1,181.6	.0	.0	.0
17.0 to 18.9	13,307.0	12,580.6	1,678.1	4,483.6	1,487.2	1.8	.0	2.1	.0	.0	4,163.6	.0	.0	.4	613.1	150.7	726.4	726.4	.0	.0	.0
19.0 to 20.9	10,965.0	10,593.2	1,484.5	4,468.0	1,018.8	1.0	.5	4.3	.0	.0	3,199.3	.0	.0	.5	288.4	127.9	371.8	371.6	.0	.0	.2
21.0 to 28.9	26,449.3	26,159.1	3,105.2	13,799.3	2,053.1	11.9	.0	21.8	.0	.0	6,711.6	.0	.0	2.2	191.2	262.8	290.2	290.1	.0	.0	.1
29.0+	7,512.9	7,512.7	1,399.5	3,871.2	891.2	9.8	5.1	37.4	.0	.0	1,200.1	.0	.0	2.8	15.8	79.8	.2	.2	.0	.0	.0
Total	120,523.5	112,812.2	14,160.2	37,245.5	14,267.7	26.9	5.9	72.4	.0	.0	34,007.9	.0	.0	6.4	11,382.5	1,636.8	7,711.3	7,709.3	.0	.0	2.0

Table 3.28—*Net volume of sawtimber on commercial timberland in the western United States, by species, diameter class, section, and region, January 1, 1977—Cont'd.*

[Million board feet, International 1/4-inch log rule]

Section, region and diameter class	All species	Softwoods: Total softwoods	Softwoods: Douglas-fir	Softwoods: Ponderosa and Jeffrey pine	Softwoods: True fir	Softwoods: Western hemlock	Softwoods: Sugar pine	Softwoods: Western white pine	Softwoods: Redwood	Softwoods: Sitka spruce	Softwoods: Engelmann and other spruce	Softwoods: Western larch	Softwoods: Western redcedar	Softwoods: Incense cedar	Softwoods: Lodgepole pine	Softwoods: Other western softwoods	Hardwoods: Total hardwoods	Hardwoods: Cottonwood and aspen	Hardwoods: Red alder	Hardwoods: Oak	Hardwoods: Other western hardwoods
Total, Rocky Mtn.:																					
9.0 to 10.9	53,577.1	53,577.1	8,878.8	3,453.5	8,547.4	593.4	.0	792.1	.0	.0	6,958.3	2,210.0	898.5	.2	20,056.9	1,188.0	.0	.0	.0	.0	.0
11.0 to 12.9	58,460.4	54,794.7	10,693.3	5,897.9	8,239.4	761.7	.0	1,180.0	.0	.0	8,159.2	2,288.0	1,020.5	.1	15,165.4	1,389.2	3,665.7	3,616.9	.0	.0	48.8
13.0 to 14.9	52,774.4	50,389.7	12,177.4	7,190.9	7,527.9	845.4	.3	1,012.3	.0	.0	8,333.6	2,225.0	1,053.6	.0	8,949.9	1,073.4	2,384.7	2,343.6	.0	.0	41.1
15.0 to 16.9	44,980.8	43,508.9	11,072.7	7,948.2	6,347.6	842.2	.0	1,064.4	.0	.0	8,319.5	1,949.1	866.6	.2	4,295.7	802.7	1,471.9	1,464.8	.0	.0	7.1
17.0 to 18.9	38,481.0	37,538.6	9,885.6	7,728.8	5,469.5	763.5	.0	1,089.9	.0	.0	7,337.1	1,784.2	843.6	.4	2,139.0	497.0	942.4	936.9	.0	.0	5.5
19.0 to 20.9	31,778.6	31,257.0	8,649.7	7,243.6	3,925.6	613.3	.5	1,082.6	.0	.0	6,000.6	1,552.6	870.6	.5	963.9	353.5	521.6	516.2	.0	.0	5.4
21.0 to 28.9	76,592.3	75,881.7	19,496.4	21,294.3	9,288.3	1,659.2	.0	2,893.6	.0	.0	13,544.9	4,091.4	2,408.6	2.2	624.1	578.7	710.6	700.6	.0	.0	10.0
29.0+	33,524.7	33,431.8	7,570.6	11,373.2	4,473.2	820.9	5.1	1,364.0	.0	.0	3,512.0	1,685.3	2,452.6	2.8	36.7	135.4	92.9	68.3	.0	.0	24.6
Total	390,169.3	380,379.5	88,424.5	72,130.4	53,818.9	6,899.6	5.9	10,478.9	.0	.0	62,165.2	17,785.6	10,414.6	6.4	52,231.6	6,017.9	9,789.8	9,647.3	.0	.0	142.5
Total, western regions:																					
9.0 to 10.9	101,344.9	101,344.9	22,236.8	7,364.5	15,685.9	10,887.7	183.0	1,083.1	197.0	725.5	10,257.1	3,300.0	2,019.8	482.2	25,017.3	1,905.0	.0	.0	.0	.0	.0
11.0 to 12.9	125,655.8	113,269.0	28,232.3	10,619.9	17,040.2	14,600.0	351.0	1,547.0	306.0	1,190.1	11,172.5	3,660.0	2,336.8	549.1	19,417.4	2,246.7	12,386.8	4,061.7	4,728.1	717.0	2,880.0
13.0 to 14.9	127,949.4	117,118.2	32,789.4	13,287.9	17,635.5	17,453.1	405.3	1,447.3	702.0	1,596.9	10,947.1	3,618.0	2,497.7	701.0	11,826.4	2,210.6	10,831.2	2,821.0	4,869.6	655.0	2,485.6
15.0 to 16.9	124,553.7	116,173.5	34,037.7	14,727.2	17,370.8	19,465.5	557.0	1,534.4	1,165.0	1,898.6	10,323.1	3,370.1	2,561.6	618.2	6,397.8	2,146.5	8,380.2	1,940.0	3,825.1	586.0	2,029.1
17.0 to 18.9	119,919.1	113,261.4	34,562.6	15,137.8	16,913.5	20,109.0	656.0	1,579.9	1,277.0	2,261.5	8,747.9	3,146.2	2,910.4	695.4	3,434.5	1,829.7	6,657.7	1,408.3	2,897.0	516.0	1,836.4
19.0 to 20.9	111,596.9	106,713.0	32,471.7	15,466.6	14,880.7	20,522.8	865.5	1,587.6	1,436.0	2,576.9	6,972.6	2,662.6	2,867.4	710.5	1,980.6	1,711.5	4,883.9	965.5	1,778.3	475.0	1,665.1
21.0 to 28.9	364,563.2	354,466.7	106,607.4	56,592.3	49,799.1	73,173.5	4,478.0	4,758.6	5,105.0	11,784.8	15,719.9	7,293.4	9,540.4	2,996.2	2,361.1	4,257.0	10,096.5	1,876.5	3,202.3	1,609.0	3,408.7
29.0+	529,627.8	525,535.6	223,378.6	58,874.2	65,213.9	80,712.3	17,505.1	3,241.0	11,819.0	28,424.7	4,351.8	3,271.3	19,107.5	5,934.8	999.7	2,701.7	4,092.2	1,105.7	258.9	807.0	1,920.6
Total	1,605,210.7	1,547,882.2	514,316.5	192,070.4	214,539.6	256,923.9	25,000.9	16,778.9	22,007.0	50,459.0	78,492.0	30,321.6	43,841.6	12,687.4	71,434.8	19,008.7	57,328.5	14,178.7	21,559.3	5,365.0	16,225.5

Table 3.29—*Number of live softwood trees on commercial timberland in the United States, by diameter class, section, region, and State, January 1, 1977*

[Thousand trees]

Section, region and State	Total	Diameter class (inches) 1.0 to 2.9	3.0 to 4.9	5.0 to 6.9	7.0 to 8.9	9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0 +
New England:													
Connecticut	120,070.0	49,873.0	27,359.0	16,172.0	9,874.0	6,763.0	4,064.0	2,473.0	1,593.0	834.0	450.0	539.0	76.0
Maine	11,563,359.0	5,627,486.0	3,032,698.0	1,569,101.0	747,651.0	334,451.0	144,075.0	60,183.0	26,133.0	11,808.0	4,596.0	4,719.0	458.0
Massachusetts	395,524.0	153,944.0	85,427.0	57,020.0	38,297.0	26,345.0	16,696.0	7,570.0	4,538.0	2,933.0	1,417.0	1,257.0	80.0
New Hampshire	1,411,448.0	660,333.0	333,998.0	181,160.0	102,493.0	62,705.0	33,379.0	17,860.0	10,087.0	4,492.0	2,167.0	2,400.0	374.0
Rhode Island	40,148.0	16,352.0	10,803.0	5,393.0	3,294.0	1,988.0	1,022.0	536.0	375.0	173.0	92.0	103.0	17.0
Vermont	797,678.0	288,982.0	227,845.0	124,682.0	74,571.0	41,468.0	21,028.0	9,936.0	4,834.0	2,369.0	912.0	996.0	55.0
Total	14,328,227.0	6,796,970.0	3,718,130.0	1,953,528.0	976,180.0	473,720.0	220,264.0	98,558.0	47,560.0	22,609.0	9,634.0	10,014.0	1,060.0
Middle Atlantic:													
Delaware	26,859.0	5,960.0	6,836.0	4,135.0	3,595.0	2,895.0	1,401.0	1,206.0	492.0	207.0	86.0	46.0	.0
Maryland	219,728.0	72,513.0	48,710.0	39,915.0	28,249.0	14,975.0	8,150.0	4,270.0	2,063.0	584.0	204.0	79.0	16.0
New Jersey	215,724.0	99,947.0	65,412.0	23,061.0	14,691.0	7,527.0	3,163.0	1,090.0	576.0	113.0	51.0	93.0	.0
New York	1,762,492.0	799,258.0	433,913.0	236,166.0	136,257.0	73,470.0	40,971.0	20,214.0	10,593.0	5,602.0	2,961.0	2,337.0	750.0
Pennsylvania	889,220.0	362,352.0	251,480.0	136,830.0	68,635.0	36,002.0	17,613.0	8,439.0	3,991.0	1,982.0	1,049.0	844.0	3.0
West Virginia	409,108.0	192,271.0	78,071.0	53,968.0	39,778.0	21,635.0	12,292.0	5,663.0	2,822.0	1,255.0	711.0	601.0	41.0
Total	3,523,131.0	1,532,301.0	884,422.0	494,075.0	291,205.0	156,504.0	83,590.0	40,882.0	20,537.0	9,743.0	5,062.0	4,000.0	810.0
Lake States:													
Michigan	4,965,327.0	2,604,033.0	1,275,141.0	610,458.0	268,418.0	110,913.0	48,635.0	23,675.0	11,806.0	5,899.0	3,165.0	3,046.0	138.0
Minnesota	2,814,458.0	1,221,470.0	824,650.0	445,410.0	191,017.0	76,846.0	30,442.0	12,357.0	6,254.0	3,236.0	1,332.0	1,394.0	50.0
North Dakota	286.0	134.0	98.0	31.0	23.0	.0	.0	.0	.0	.0	.0	.0	.0
South Dakota (East)	12,967.0	2,759.0	3,850.0	3,317.0	1,683.0	804.0	322.0	124.0	69.0	25.0	14.0	.0	.0
Wisconsin	2,191,999.0	949,900.0	606,137.0	345,097.0	166,868.0	67,104.0	26,703.0	13,951.0	7,731.0	4,271.0	2,104.0	1,998.0	135.0
Total	9,985,037.0	4,778,296.0	2,709,876.0	1,404,313.0	628,009.0	255,667.0	106,102.0	50,107.0	25,860.0	13,431.0	6,615.0	6,438.0	323.0
Central:													
Illinois	24,468.0	7,944.0	8,544.0	4,656.0	2,155.0	777.0	251.0	85.0	30.0	9.0	3.0	8.0	6.0
Indiana	73,803.0	34,145.0	21,709.0	9,340.0	4,879.0	2,204.0	915.0	373.0	128.0	43.0	20.0	26.0	21.0
Iowa	13,057.0	7,521.0	3,007.0	1,205.0	709.0	345.0	160.0	65.0	30.0	15.0	.0	.0	.0
Kansas	1,531.0	536.0	476.0	290.0	140.0	55.0	18.0	6.0	2.0	1.0	1.0	4.0	2.0
Kentucky	630,285.0	327,271.0	136,017.0	73,945.0	42,290.0	26,355.0	13,362.0	7,330.0	2,452.0	726.0	295.0	224.0	18.0
Missouri	351,212.0	190,314.0	82,819.0	35,779.0	21,878.0	11,900.0	5,864.0	1,782.0	555.0	216.0	70.0	26.0	9.0
Nebraska	45,386.0	11,087.0	9,375.0	7,640.0	6,323.0	4,581.0	3,061.0	2,087.0	770.0	325.0	112.0	25.0	.0
Ohio	102,306.0	47,922.0	29,096.0	13,365.0	6,702.0	2,999.0	1;362.0	580.0	168.0	83.0	16.0	13.0	.0
Total	1,242,048.0	626,740.0	291,043.0	146,220.0	85,076.0	49,216.0	24,993.0	12,308.0	4,135.0	1,418.0	517.0	326.0	56.0
Total, North	29,078,443.0	13,734,307.0	7,603,471.0	3,998,136.0	1,980,470.0	935,107.0	434,949.0	201,855.0	98,092.0	47,201.0	21,828.0	20,778.0	2,249.0
South Atlantic:													
North Carolina	3,854,178.0	1,711,244.0	957,443.0	501,140.0	303,402.0	184,348.0	96,633.0	51,346.0	26,903.0	11,742.0	5,368.0	4,160.0	449.0
South Carolina	3,328,703.0	1,597,330.0	831,537.0	447,911.0	200,998.0	107,211.0	65,516.0	39,789.0	20,314.0	8,961.0	4,740.0	4,084.0	312.0
Virginia	2,327,622.0	1,041,891.0	578,511.0	325,625.0	189,024.0	99,139.0	51,023.0	23,958.0	10,554.0	4,594.0	1,812.0	1,379.0	112.0
Total	9,510,503.0	4,350,465.0	2,367,491.0	1,274,676.0	693,424.0	390,698.0	213,172.0	115,093.0	57,771.0	25,297.0	11,920.0	9,623.0	873.0
East Gulf:													
Florida	3,515,707.0	1,408,186.0	991,940.0	555,439.0	280,081.0	140,653.0	74,492.0	36,674.0	16,290.0	6,937.0	2,778.0	1,985.0	252.0
Georgia	6,815,707.0	2,865,913.0	1,859,874.0	981,680.0	537,031.0	285,278.0	148,450.0	75.456.0	35,953.0	15,230.0	6,255.0	4,335.0	252.0
Total	10,331,414.0	4,274,099.0	2,851,814.0	1,537,119.0	817,112.0	425,931.0	222,942.0	112,130.0	52,243.0	22,167.0	9,033.0	6,320.0	504.0
Central Gulf:													
Alabama	5,280,809.0	2,481,819.0	1,291,298.0	692,471.0	384,000.0	207,519.0	112,308.0	57,644.0	29,586.0	13,698.0	5,798.0	4,515.0	153.0
Mississippi	2,614,907.0	1,036,598.0	666,469.0	358,016.0	235,704.0	139,456.0	85,682.0	45,787.0	24,634.0	12,064.0	5,713.0	4,535.0	249.0
Tennessee	1,460,375.0	714,100.0	365,569.0	192,854.0	100,128.0	48,778.0	23,266.0	9,362.0	3,439.0	1,501.0	666.0	615.0	97.0
Total	9,356,091.0	4,232,517.0	2,323,336.0	1,243,341.0	719,832.0	395,753.0	221,256.0	112,793.0	57,659.0	27,263.0	12,177.0	9,665.0	499.0
West Gulf:													
Arkansas	3,563,603.0	1,687,645.0	991,388.0	402,944.0	206,105.0	124,616.0	74,174.0	39,875.0	19,853.0	9,173.0	3,973.0	3,437.0	420.0
Louisiana	2,520,557.0	1,017,721.0	619,793.0	346,851.0	215,996.0	124,670.0	79,817.0	50,469.0	29,892.0	16,945.0	9,312.0	8,384.0	707.0
Oklahoma	753,929.0	478,091.0	133,728.0	57,090.0	35,023.0	25,199.0	13,858.0	6,885.0	2,715.0	823.0	380.0	121.0	16.0
Texas	2,073,696.0	888,723.0	450,285.0	266,492.0	172,299.0	114,848.0	76,680.0	48,383.0	27,689.0	14,616.0	7,469.0	5,961.0	251.0
Total	8,911,785.0	4,072,180.0	2,195,194.0	1,073,377.0	629,423.0	389,333.0	244,529.0	145,612.0	80,149.0	41,557.0	21,134.0	17,903.0	1,394.0
Total, South	38,109,793.0	16,929,261.0	9,737,835.0	5,128,513.0	2,859,791.0	1,601,715.0	901,899.0	485,628.0	247,822.0	116,284.0	54,264.0	43,511.0	3,270.0
Pacific Northwest:													
Alaska:													
Coastal	2,728,584.0	1,008,863.0	497,596.0	293,260.0	193,758.0	161,900.0	119,661.0	92,428.0	78,978.0	60,962.0	49,298.0	114,811.0	57,069.0
Interior	741,273.0	312,487.0	168,345.0	96,342.0	68,926.0	45,558.0	25,277.0	13,867.0	6,465.0	2,348.0	1,011.0	613.0	34.0
Summary	3,469,857.0	1,321,350.0	665,941.0	389,602.0	262,684.0	207,458.0	144,938.0	106,295.0	85,443.0	63,310.0	50,309.0	115,424.0	57,103.0
Oregon:													
Western	8,786,207.0	4,159,985.0	2,097,613.0	682,148.0	457,223.0	299,048.0	230,386.0	165,947.0	130,535.0	103,845.0	78,044.0	198,012.0	183,421.0
Eastern	5,093,326.0	2,541,518.0	1,116,336.0	571,349.0	326,315.0	195,060.0	108,373.0	68,857.0	43,174.0	30,515.0	22,886.0	48,564.0	20,379.0
Summary	13,879,533.0	6,701,503.0	3,213,949.0	1,253,497.0	783,538.0	494,108.0	338,759.0	234,804.0	173,709.0	134,360.0	100,930.0	246,576.0	203,800.0
Washington:													
Western	4,041,242.0	1,797,966.0	791,301.0	447,492.0	281,790.0	189,821.0	133,439.0	94,700.0	70,671.0	52,494.0	39,159.0	84,824.0	57,585.0
Eastern	3,799,157.0	1,860,834.0	902,934.0	394,779.0	242,435.0	139,487.0	84,194.0	57,373.0	35,864.0	24,758.0	16,253.0	30,215.0	10,031.0
Summary	7,840,399.0	3,658,800.0	1,694,235.0	842,271.0	524,225.0	329,308.0	217,633.0	152,073.0	106,535.0	77,252.0	55,412.0	115,039.0	67,616.0
Total	25,189,789.0	11,681,653.0	5,574,125.0	2,485,370.0	1,570,447.0	1,030,874.0	701,330.0	493,172.0	365,687.0	274,922.0	206,651.0	477,039.0	328,519.0

Table 3.29—*Number of live softwood trees on commercial timberland in the United States, by diameter class, section, region, and State, January 1, 1977—Cont'd.*

[Thousand trees]

Section, region and State	Total	Diameter class (inches)											
		1.0 to 2.9	3.0 to 4.9	5.0 to 6.9	7.0 to 8.9	9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0 +
Pacific Southwest:													
California	5,588,231.0	2,745,359.0	1,382,242.0	415,789.0	257,041.0	176,036.0	197,475.0	96,603.0	72,290.0	52,043.0	40,294.0	92,407.0	60,652.0
Hawaii	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	5,588,231.0	2,745,359.0	1,382,242.0	415,789.0	257,041.0	176,036.0	197,475.0	96,603.0	72,290.0	52,043.0	40,294.0	92,407.0	60,652.0
Total, Pacific Coast	30,778,020.0	14,427,012.0	6,956,367.0	2,901,159.0	1,827,488.0	1,206,910.0	898,805.0	589,775.0	437,977.0	326,965.0	246,945.0	569,446.0	389,171.0
Northern Rocky Mtn.:													
Idaho	5,070,766.0	1,696,085.0	1,192,222.0	782,151.0	513,891.0	326,045.0	194,759.0	127,720.0	78,360.0	51,509.0	33,491.0	57,833.0	16,700.0
Montana	9,820,900.0	4,174,897.0	2,315,931.0	1,468,299.0	844,204.0	455,988.0	244,692.0	133,715.0	75,801.0	43,397.0	26,590.0	32,611.0	4,775.0
South Dakota (West)	629,478.0	286,920.0	141,024.0	81,214.0	51,136.0	31,368.0	18,192.0	9,936.0	5,144.0	2,571.0	1,206.0	757.0	10.0
Wyoming	2,448,465.0	1,045,126.0	579,021.0	340,913.0	202,557.0	122,231.0	69,090.0	39,512.0	20,403.0	12,011.0	6,786.0	9,715.0	1,100.0
Total	17,969,609.0	7,203,028.0	4,228,198.0	2,672,577.0	1,611,788.0	935,632.0	526,733.0	310,883.0	179,708.0	109,488.0	68,073.0	100,916.0	22,585.0
Southern Rocky Mtn.:													
Arizona	1,156,096.0	496,776.0	253,464.0	140,216.0	90,217.0	54,916.0	36,788.0	24,398.0	17,274.0	12,501.0	9,119.0	17,281.0	3,146.0
Colorado	3,110,896.0	1,156,522.0	713,674.0	462,005.0	310,965.0	194,851.0	113,875.0	65,855.0	38,886.0	22,756.0	13,161.0	16,638.0	1,708.0
Nevada	21,659.0	5,821.0	4,379.0	3,154.0	1,906.0	1,565.0	1,108.0	799.0	725.0	509.0	407.0	928.0	358.0
New Mexico	1,611,064.0	641,757.0	376,917.0	230,513.0	136,775.0	80,438.0	51,744.0	33,147.0	22,230.0	14,327.0	8,906.0	12,763.0	1,547.0
Utah	1,000,021.0	382,628.0	235,610.0	153,155.0	90,012.0	53,590.0	32,499.0	19,748.0	11,813.0	8,025.0	4,703.0	6,644.0	1,594.0
Total	6,899,736.0	2,683,504.0	1,584,044.0	989,043.0	629,875.0	385,360.0	236,014.0	143,947.0	90,928.0	58,118.0	36,296.0	54,254.0	8,353.0
Total, Rocky Mtn.	24,869,345.0	9,886,532.0	5,812,242.0	3,661,620.0	2,241,663.0	1,320,992.0	762,747.0	454,830.0	270,636.0	167,606.0	104,369.0	155,170.0	30,938.0
Total, all regions	122,835,601.0	54,977,112.0	30,109,915.0	15,689,428.0	8,909,412.0	5,064,724.0	2,998,400.0	1,732,088.0	1,054,527.0	658,056.0	427,406.0	788,905.0	425,628.0

Table 3.30— *Number of live hardwood trees on commercial timberland in the United States, by diameter class, section, region, and State, January 1, 1977*

[Thousand trees]

Section, region and State	Total	Diameter class (inches) 1.0 to 2.9	3.0 to 4.9	5.0 to 6.9	7.0 to 8.9	9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0 +
New England:													
Connecticut	959,051.0	494,456.0	184,902.0	109,121.0	71,195.0	45,096.0	25,384.0	13,604.0	7,121.0	4,218.0	2,015.0	1,756.0	183.0
Maine	4,980,154.0	2,450,564.0	1,277,936.0	588,253.0	313,093.0	158,323.0	91,213.0	50,369.0	25,070.0	11,586.0	6,704.0	6,764.0	279.0
Massachusetts	1,496,012.0	748,685.0	339,049.0	190,033.0	107,148.0	56,645.0	29,150.0	13,123.0	5,617.0	3,274.0	1,493.0	1,637.0	158.0
New Hampshire	2,600,652.0	1,416,715.0	555,556.0	288,636.0	156,676.0	89,179.0	48,038.0	23,081.0	10,765.0	5,436.0	2,916.0	3,202.0	452.0
Rhode Island	185,875.0	90,651.0	42,381.0	25,160.0	13,435.0	7,274.0	3,756.0	1,736.0	642.0	463.0	177.0	180.0	20.0
Vermont	1,765,132.0	763,877.0	472,130.0	207,526.0	138,107.0	79,350.0	46,943.0	26,623.0	13,649.0	7,300.0	3,674.0	5,445.0	508.0
Total	11,986,876.0	5,964,948.0	2,871,954.0	1,408,729.0	799,654.0	435,867.0	244,484.0	128,536.0	62,864.0	32,277.0	16,979.0	18,984.0	1,600.
Middle Atlantic:													
Delaware	239,357.0	136,996.0	50,343.0	23,453.0	12,060.0	6,843.0	4,024.0	2,261.0	1,434.0	841.0	503.0	599.0	.0
Maryland	1,290,791.0	775,709.0	234,795.0	109,122.0	62,440.0	40,412.0	25,590.0	17,119.0	10,802.0	6,392.0	3,348.0	4,535.0	527.0
New Jersey	919,843.0	530,565.0	207,367.0	87,918.0	43,399.0	23,572.0	11,733.0	6,667.0	4,450.0	1,897.0	1,107.0	1,168.0	.0
New York	5,956,267.0	2,861,085.0	1,472,446.0	703,889.0	394,280.0	231,855.0	132,677.0	74,061.0	40,320.0	21,319.0	11,515.0	7,125.0	5,695.0
Pennsylvania	8,279,283.0	3,199,523.0	2,288,757.0	1,274,563.0	731,695.0	389,011.0	202,495.0	97,503.0	48,428.0	24,726.0	13,103.0	9,453.0	26.0
West Virginia	7,602,884.0	4,625,583.0	1,434,208.0	658,842.0	358,911.0	215,439.0	122,515.0	79,931.0	46,644.0	26,099.0	14,526.0	17,709.0	2,477.0
Total	24,288,425.0	12,129,461.0	5,687,916.0	2,857,787.0	1,602,785.0	907,132.0	499,034.0	277,542.0	152,078.0	81,274.0	44,102.0	40,589.0	8,725.0
Lake States:													
Michigan	9,212,911.0	4,469,982.0	2,370,116.0	1,167,847.0	583,678.0	302,115.0	153,541.0	78,939.0	42,183.0	21,494.0	11,284.0	11,000.0	732.0
Minnesota	4,898,586.0	2,321,321.0	1,061,115.0	659,498.0	419,448.0	231,567.0	112,252.0	49,507.0	23,091.0	10,718.0	4,780.0	4,764.0	525.0
North Dakota	363,125.0	173,824.0	99,611.0	47,966.0	22,276.0	10,132.0	4,759.0	2,141.0	1,199.0	603.0	272.0	273.0	69.0
South Dakota (East)	50,866.0	14,004.0	11,354.0	8,569.0	6,173.0	4,032.0	2,549.0	1,689.0	1,071.0	605.0	331.0	387.0	102.0
Wisconsin	6,115,105.0	3,116,802.0	1,202,657.0	762,176.0	469,038.0	256,511.0	132,887.0	86,898.0	43,475.0	21,464.0	11,327.0	10,795.0	1,075.0
Total	20,640,593.0	10,095,933.0	4,744,853.0	2,646,056.0	1,500,613.0	804,357.0	405,988.0	219,174.0	111,019.0	54,884.0	27,994.0	27,219.0	2,503.0
Central:													
Illinois	898,795.0	268,064.0	246,121.0	157,036.0	94,395.0	55,241.0	31,949.0	19,277.0	11,503.0	6,794.0	4,144.0	3,888.0	383.0
Indiana	1,583,905.0	797,254.0	343,367.0	188,373.0	99,144.0	58,148.0	36,607.0	24,428.0	15,665.0	9,118.0	5,121.0	5,819.0	861.0
Iowa	584,485.0	293,991.0	138,202.0	60,582.0	33,247.0	20,497.0	13,378.0	9,391.0	5,822.0	3,689.0	2,208.0	2,904.0	574.0
Kansas	460,584.0	193,563.0	113,358.0	66,335.0	35,576.0	19,444.0	11,542.0	7,487.0	4,497.0	2,927.0	1,896.0	3,575.0	384.0
Kentucky	7,404,851.0	4,742,098.0	1,328,607.0	547,902.0	295,043.0	194,181.0	117,860.0	74,391.0	46,162.0	26,108.0	13,592.0	16,604.0	2,303.0
Missouri	7,112,159.0	4,361,367.0	1,407,774.0	573,966.0	312,875.0	201,854.0	115,610.0	69,287.0	35,248.0	16,547.0	7,951.0	8,742.0	938.0
Nebraska	80,396.0	12,179.0	15,388.0	12,734.0	10,713.0	8,684.0	6,682.0	4,837.0	3,271.0	2,188.0	1,432.0	1,828.0	460.0
Ohio	3,170,937.0	1,747,816.0	800,788.0	290,536.0	134,906.0	75,069.0	46,791.0	29,647.0	18,476.0	10,828.0	6,116.0	8,867.0	1,097.0
Total	21,296,112.0	12,416,332.0	4,393,605.0	1,897,464.0	1,015,899.0	633,118.0	380,419.0	238,745.0	140,644.0	78,199.0	42,460.0	52,227.0	7,000.0
Total, North	78,212,006.0	40,606,674.0	17,698,328.0	8,810,036.0	4,918,951.0	2,780,474.0	1,529,925.0	863,997.0	466,605.0	246,634.0	131,535.0	139,019.0	19,828.0
South Atlantic:													
North Carolina	13,244,992.0	8,921,203.0	2,366,555.0	879,649.0	449,448.0	255,554.0	155,463.0	94,832.0	54,950.0	30,424.0	16,051.0	18,637.0	2,226.0
South Carolina	7,507,224.0	5,039,528.0	1,476,586.0	467,272.0	226,401.0	118,657.0	71,788.0	43,727.0	26,220.0	16,319.0	8,447.0	10,724.0	1,555.0
Virginia	10,368,017.0	6,812,549.0	1,786,610.0	736,746.0	415,558.0	254,622.0	152,336.0	92,839.0	53,534.0	28,681.0	15,398.0	17,029.0	2,115.0
Total	31,120,233.0	20,773,280.0	5,629,751.0	2,083,667.0	1,091,407.0	628,833.0	379,587.0	231,398.0	134,704.0	75,424.0	39,896.0	46,390.0	5,896.0
East Gulf:													
Florida	3,882,437.0	2,303,560.0	841,566.0	338,569.0	172,891.0	94,986.0	54,403.0	31,889.0	18,448.0	10,776.0	6,285.0	7,863.0	1,201.0
Georgia	12,365,745.0	8,205,678.0	2,380,242.0	853,980.0	414,916.0	225,923.0	128,635.0	73,339.0	39,364.0	19,586.0	10,456.0	11,997.0	1,629.0
Total	16,248,182.0	10,509,238.0	3,221,808.0	1,192,549.0	587,807.0	320,909.0	183,038.0	105,228.0	57,812.0	30,362.0	16,741.0	19,860.0	2,830.0
Central Gulf:													
Alabama	13,349,628.0	9,291,140.0	2,342,281.0	836,803.0	393,109.0	217,234.0	118,630.0	68,908.0	38,857.0	20,137.0	10,058.0	11,047.0	1,424.0
Mississippi	8,852,441.0	6,038,221.0	1,518,958.0	561,589.0	297,136.0	173,267.0	106,123.0	68,170.0	38,698.0	22,056.0	11,820.0	14,321.0	2,082.0
Tennessee	8,694,265.0	5,437,020.0	1,763,303.0	631,722.0	339,903.0	211,329.0	133,599.0	79,387.0	48,072.0	23,019.0	11,369.0	13,805.0	1,737.0
Total	30,896,334.0	20,766,381.0	5,624,542.0	2,030,114.0	1,030,148.0	601,830.0	358,352.0	216,465.0	125,627.0	65,212.0	33,247.0	39,173.0	5,243.0
West Gulf:													
Arkansas	11,883,084.0	6,913,384.0	3,008,236.0	993,572.0	434,764.0	229,894.0	127,341.0	75,926.0	44,516.0	24,086.0	13,467.0	16,279.0	1,619.0
Louisiana	6,584,163.0	4,234,574.0	1,195,999.0	472,755.0	253,074.0	157,431.0	96,322.0	66,123.0	43,858.0	26,013.0	15,723.0	19,485.0	2,806.0
Oklahoma	2,299,887.0	1,408,157.0	493,906.0	185,632.0	93,778.0	49,670.0	31,309.0	18,375.0	9,582.0	4,498.0	2,427.0	2,389.0	164.0
Texas	5,657,620.0	3,650,918.0	1,034,893.0	424,142.0	219,895.0	130,908.0	79,872.0	49,217.0	28,751.0	16,495.0	9,277.0	11,348.0	1,904.0
Total	26,424,754.0	16,207,033.0	5,733,034.0	2,076,101.0	1,001,511.0	567,903.0	334,844.0	209,641.0	126,707.0	71,092.0	40,894.0	49,501.0	6,493.0
Total, South	104,689,503.0	68,255,932.0	20,209,135.0	7,382,431.0	3,710,873.0	2,119,475.0	1,255,821.0	762,732.0	444,850.0	242,090.0	130,778.0	154,924.0	20,462.0
Pacific Northwest:													
Alaska:													
Coastal	48,587.0	18,459.0	11,523.0	7,433.0	2,594.0	3,042.0	1,759.0	1,508.0	882.0	657.0	204.0	340.0	186.0
Interior	1,518,688.0	733,617.0	407,830.0	198,919.0	95,350.0	43,629.0	20,138.0	9,349.0	4,274.0	2,260.0	1,274.0	1,648.0	400.0
Summary	1,567,275.0	752,076.0	419,353.0	206,352.0	97,944.0	46,671.0	21,897.0	10,857.0	5,156.0	2,917.0	1,478.0	1,988.0	586.0
Oregon:													
Western	4,255,805.0	2,149,582.0	1,187,487.0	378,354.0	227,117.0	136,169.0	70,722.0	40,174.0	24,509.0	14,907.0	10,106.0	13,669.0	3,009.0
Eastern	63,057.0	41,073.0	12,713.0	4,153.0	2,851.0	1,002.0	692.0	324.0	111.0	60.0	11.0	56.0	11.0
Summary	4,318,862.0	2,190,655.0	1,200,200.0	382,507.0	229,968.0	137,171.0	71,414.0	40,498.0	24,620.0	14,967.0	10,117.0	13,725.0	3,020.0
Washington:													
Western	1,322,402.0	565,148.0	310,659.0	181,157.0	109,288.0	64,634.0	38,673.0	22,735.0	13,217.0	7,228.0	3,866.0	5,008.0	789.0
Eastern	430,568.0	285,529.0	105,551.0	20,403.0	10,993.0	3,583.0	2,006.0	1,010.0	589.0	311.0	222.0	315.0	56.0
Summary	1,752,970.0	850,677.0	416,210.0	201,560.0	120,281.0	68,217.0	40,679.0	23,745.0	13,806.0	7,539.0	4,088.0	5,323.0	845.0
Total	7,639,107.0	3,793,408.0	2,035,763.0	790,419.0	448,193.0	252,059.0	133,990.0	75,100.0	43,582.0	25,423.0	15,683.0	21,036.0	4,451.0

Table 3.30— *Number of live hardwood trees on commercial timberland in the United States, by diameter class, section, region, and State, January 1, 1977—Cont'd.*

[Thousand trees]

Section, region and State	Total	Diameter class (inches) 1.0 to 2.9	3.0 to 4.9	5.0 to 6.9	7.0 to 8.9	9.0 to 10.9	11.0 to 12.9	13.0 to 14.9	15.0 to 16.9	17.0 to 18.9	19.0 to 20.9	21.0 to 28.9	29.0 +
Pacific Southwest:													
California	2,181,287.0	1,185,204.0	502,286.0	195,887.0	114,973.0	64,576.0	40,391.0	25,845.0	16,230.0	10,613.0	8,309.0	13,305.0	3,668.0
Hawaii	48,562.0	13,578.0	8,910.0	6,182.0	6,930.0	4,811.0	1,527.0	1,740.0	1,770.0	1,112.0	789.0	789.0	424.0
Total	2,229,849.0	1,198,782.0	511,196.0	202,069.0	121,903.0	69,387.0	41,918.0	27,585.0	18,000.0	11,725.0	9,098.0	14,094.0	4,092.0
Total, Pacific Coast	9,868,956.0	4,992,190.0	2,546,959.0	992,488.0	570,096.0	321,446.0	175,908.0	102,685.0	61,582.0	37,148.0	24,781.0	35,130.0	8,543.0
Northern Rocky Mtn.:													
Idaho	146,041.0	52,902.0	40,611.0	27,731.0	14,110.0	6,171.0	2,252.0	1,049.0	465.0	259.0	156.0	264.0	71.0
Montana	112,065.0	50,615.0	23,173.0	15,543.0	7,451.0	4,204.0	3,039.0	2,496.0	1,753.0	1,164.0	1,057.0	1,533.0	37.0
South Dakota (West)	39,251.0	18,467.0	7,751.0	9,776.0	2,303.0	664.0	174.0	49.0	18.0	17.0	6.0	19.0	7.0
Wyoming	198,837.0	78,184.0	55,141.0	36,368.0	17,297.0	7,398.0	2,910.0	1,071.0	314.0	113.0	35.0	5.0	1.0
Total	496,194.0	200,168.0	126,676.0	89,418.0	41,161.0	18,437.0	8,375.0	4,665.0	2,550.0	1,553.0	1,254.0	1,821.0	116.0
Southern Rocky Mtn.:													
Arizona	165,860.0	59,439.0	31,997.0	36,178.0	15,140.0	8,269.0	5,930.0	3,371.0	2,711.0	916.0	1,027.0	795.0	87.0
Colorado	1,944,838.0	793,954.0	509,251.0	343,623.0	169,128.0	79,202.0	28,383.0	11,847.0	5,220.0	2,505.0	1,047.0	665.0	13.0
Nevada	5,112.0	532.0	510.0	2,201.0	798.0	456.0	484.0	119.0	5.0	3.0	2.0	2.0	.0
New Mexico	391,157.0	178,955.0	92,167.0	56,929.0	29,432.0	16,358.0	8,290.0	4,212.0	2,238.0	1,557.0	570.0	435.0	14.0
Utah	718,904.0	232,256.0	208,636.0	153,422.0	70,837.0	32,326.0	12,544.0	5,521.0	2,149.0	849.0	203.0	161.0	.0
Total	3,225,871.0	1,265,136.0	842,561.0	592,353.0	285,335.0	136,611.0	55,631.0	25,070.0	12,323.0	5,830.0	2,849.0	2,058.0	114.0
Total, Rocky Mtn.	3,722,065.0	1,465,304.0	969,237.0	681,771.0	326,496.0	155,048.0	64,006.0	29,735.0	14,873.0	7,383.0	4,103.0	3,879.0	230.0
Total, all regions	196,492,516.0	115,320,100.0	41,423,659.0	17,866,726.0	9,526,416.0	5,376,443.0	3,025,660.0	1,759,149.0	987,910.0	533,255.0	291,197.0	332,952.0	49,063.0

Table 3.31—*Annual mortality of growing stock on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976*

[Thousand cubic feet]

Section, region and species group	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952
New England:																				
Softwoods	137,397.0	152,002.0	129,700.0	105,600.0	911.0	3,506.0	3,080.0	2,670.0	5,221.0	4,298.0	3,427.0	2,811.0	60,121.0	60,366.0	40,912.0	33,860.0	71,144.0	83,832.0	82,281.0	66,259.0
Hardwoods	88,738.0	104,244.0	86,500.0	73,500.0	1,819.0	5,987.0	5,330.0	4,610.0	4,283.0	5,379.0	3,828.0	2,982.0	23,656.0	23,625.0	18,643.0	17,172.0	58,980.0	69,253.0	58,699.0	48,736.0
Total	226,135.0	256,246.0	216,200.0	179,100.0	2,730.0	9,493.0	8,410.0	7,280.0	9,504.0	9,677.0	7,255.0	5,793.0	83,777.0	83,991.0	59,555.0	51,032.0	130,124.0	153,085.0	140,980.0	114,995.0
Middle Atlantic:																				
Softwoods	54,147.0	55,936.0	50,300.0	45,200.0	835.0	1,186.0	1,100.0	900.0	5,340.0	4,994.0	4,500.0	4,100.0	5,254.0	4,808.0	4,339.0	4,016.0	42,718.0	44,948.0	40,361.0	36,184.0
Hardwoods	268,035.0	252,532.0	214,900.0	174,700.0	9,004.0	8,322.0	6,700.0	5,200.0	29,297.0	28,012.0	23,700.0	19,000.0	19,929.0	17,056.0	14,620.0	11,966.0	209,805.0	199,142.0	169,880.0	138,534.0
Total	322,182.0	308,468.0	265,200.0	219,900.0	9,839.0	9,508.0	7,800.0	6,100.0	34,637.0	33,006.0	28,200.0	23,100.0	25,183.0	21,864.0	18,959.0	15,982.0	252,523.0	244,090.0	210,241.0	174,718.0
Lake States:																				
Softwoods	130,410.0	121,916.0	111,151.0	63,204.0	21,414.0	24,375.0	24,005.0	15,962.0	36,685.0	35,868.0	33,107.0	19,538.0	22,041.0	18,657.0	17,397.0	8,200.0	50,270.0	43,016.0	36,642.0	19,504.0
Hardwoods	398,625.0	341,333.0	277,624.0	167,144.0	32,892.0	30,778.0	26,838.0	15,608.0	102,751.0	85,347.0	67,306.0	39,682.0	42,787.0	36,699.0	27,953.0	14,402.0	220,195.0	188,509.0	155,527.0	97,452.0
Total	529,035.0	463,249.0	388,775.0	230,348.0	54,306.0	55,153.0	50,843.0	31,570.0	139,436.0	121,215.0	100,413.0	59,220.0	64,828.0	55,356.0	45,350.0	22,602.0	270,465.0	231,525.0	192,169.0	116,956.0
Central States:																				
Softwoods	6,759.0	3,955.0	3,598.0	3,030.0	1,077.0	991.0	917.0	777.0	267.0	482.0	411.0	311.0	169.0	129.0	110.0	108.0	5,246.0	2,353.0	2,160.0	1,834.0
Hardwoods	135,461.0	122,230.0	114,870.0	101,870.0	5,339.0	5,166.0	4,635.0	4,109.0	5,608.0	4,735.0	4,294.0	3,451.0	1,965.0	1,717.0	1,467.0	1,377.0	122,549.0	110,612.0	104,474.0	92,933.0
Total	142,220.0	126,185.0	118,468.0	104,900.0	6,416.0	6,157.0	5,552.0	4,886.0	5,875.0	5,217.0	4,705.0	3,762.0	2,134.0	1,846.0	1,577.0	1,485.0	127,795.0	112,965.0	106,634.0	94,767.0
Total, North:																				
Softwoods	328,713.0	333,809.0	294,749.0	217,034.0	24,237.0	30,058.0	29,102.0	20,309.0	47,513.0	45,642.0	41,445.0	26,760.0	87,585.0	83,960.0	62,758.0	46,184.0	169,378.0	174,149.0	161,444.0	123,781.0
Hardwoods	890,859.0	820,339.0	693,894.0	517,214.0	49,054.0	50,253.0	43,503.0	29,527.0	141,939.0	123,473.0	99,128.0	65,115.0	88,337.0	79,097.0	62,683.0	44,917.0	611,529.0	567,516.0	488,580.0	377,655.0
Total	1,219,572.0	1,154,148.0	988,643.0	734,248.0	73,291.0	80,311.0	72,605.0	49,836.0	189,452.0	169,115.0	140,573.0	91,875.0	175,922.0	163,057.0	125,441.0	91,101.0	780,907.0	741,665.0	650,024.0	501,436.0
South Atlantic:																				
Softwoods	175,430.0	148,841.0	125,200.0	120,200.0	9,710.0	8,443.0	5,500.0	6,500.0	7,690.0	6,085.0	6,100.0	4,100.0	22,201.0	18,792.0	27,600.0	19,900.0	135,829.0	115,521.0	86,000.0	89,700.0
Hardwoods	167,641.0	151,318.0	173,400.0	160,400.0	17,173.0	14,368.0	10,700.0	11,300.0	9,228.0	7,425.0	4,500.0	3,000.0	18,876.0	17,226.0	20,800.0	20,900.0	122,364.0	112,299.0	137,400.0	125,200.0
Total	343,071.0	300,159.0	298,600.0	280,600.0	26,883.0	22,811.0	16,200.0	17,800.0	16,918.0	13,510.0	10,600.0	7,100.0	41,077.0	36,018.0	48,400.0	40,800.0	258,193.0	227,820.0	223,400.0	214,900.0
East Gulf:																				
Softwoods	124,764.0	110,224.0	135,000.0	114,500.0	5,977.0	5,340.0	4,800.0	5,300.0	5,880.0	5,209.0	10,300.0	7,000.0	24,230.0	21,476.0	22,600.0	24,300.0	88,677.0	78,199.0	97,300.0	77,900.0
Hardwoods	119,142.0	109,876.0	127,600.0	123,400.0	7,185.0	6,567.0	8,300.0	7,300.0	3,790.0	3,515.0	4,900.0	3,300.0	21,249.0	19,763.0	21,200.0	22,900.0	86,918.0	80,031.0	93,200.0	89,900.0
Total	243,906.0	220,100.0	262,600.0	237,900.0	13,162.0	11,907.0	13,100.0	12,600.0	9,670.0	8,724.0	15,200.0	10,300.0	45,479.0	41,239.0	43,800.0	47,200.0	175,595.0	158,230.0	190,500.0	167,800.0
Central Gulf:																				
Softwoods	118,693.0	80,790.0	60,000.0	43,200.0	10,624.0	10,995.0	6,900.0	4,332.0	5,004.0	2,277.0	1,900.0	2,100.0	24,707.0	19,058.0	15,000.0	12,048.0	78,358.0	48,460.0	36,200.0	24,720.0
Hardwoods	165,566.0	141,170.0	199,400.0	179,000.0	4,993.0	5,690.0	8,000.0	4,627.0	6,400.0	6,333.0	5,300.0	4,459.0	26,589.0	20,160.0	28,600.0	20,475.0	127,584.0	108,987.0	157,500.0	149,439.0
Total	284,259.0	221,960.0	259,400.0	222,200.0	15,617.0	16,685.0	14,900.0	8,959.0	11,404.0	8,610.0	7,200.0	6,559.0	51,296.0	39,218.0	43,600.0	32,523.0	205,942.0	157,447.0	193,700.0	174,159.0
West Gulf:																				
Softwoods	93,274.0	85,043.0	77,300.0	54,200.0	8,438.0	11,358.0	11,500.0	7,300.0	1,964.0	1,210.0	1,100.0	700.0	40,198.0	33,426.0	37,200.0	26,700.0	42,674.0	39,049.0	27,500.0	19,500.0
Hardwoods	156,369.0	149,970.0	248,800.0	158,300.0	7,388.0	7,618.0	10,600.0	6,300.0	10,496.0	6,213.0	6,300.0	3,400.0	34,441.0	35,245.0	53,000.0	29,800.0	104,044.0	100,894.0	178,900.0	118,800.0
Total	249,643.0	235,013.0	326,100.0	212,500.0	15,826.0	18,976.0	22,100.0	13,600.0	12,460.0	7,423.0	7,400.0	4,100.0	74,639.0	68,671.0	90,200.0	56,500.0	146,718.0	139,943.0	206,400.0	138,300.0
Total, South:																				
Softwoods	512,161.0	424,898.0	397,500.0	332,100.0	34,749.0	36,136.0	28,700.0	23,432.0	20,538.0	14,781.0	19,400.0	13,900.0	111,336.0	92,752.0	102,400.0	82,948.0	345,538.0	281,229.0	247,000.0	211,820.0
Hardwoods	608,718.0	552,334.0	749,200.0	621,100.0	36,739.0	34,243.0	37,600.0	29,527.0	29,914.0	23,486.0	21,000.0	14,159.0	101,155.0	92,394.0	123,600.0	94,075.0	440,910.0	402,211.0	567,000.0	483,339.0
Total	1,120,879.0	977,232.0	1,146,700.0	953,200.0	71,488.0	70,379.0	66,300.0	52,959.0	50,452.0	38,267.0	40,400.0	28,059.0	212,491.0	185,146.0	226,000.0	177,023.0	786,448.0	683,440.0	814,000.0	695,159.0
Pacific Northwest: Douglas-fir subregion (Western Oregon and western Washington):																				
Softwoods	484,400.0	577,200.0	663,200.0	700,300.0	237,200.0	244,300.0	296,500.0	296,400.0	113,600.0	135,500.0	127,100.0	127,900.0	100,500.0	147,400.0	188,200.0	223,600.0	33,100.0	50,000.0	51,400.0	52,400.0
Hardwoods	70,600.0	66,600.0	62,400.0	49,400.0	6,500.0	6,300.0	6,700.0	5,800.0	11,200.0	9,900.0	16,100.0	13,300.0	25,600.0	21,300.0	17,900.0	12,700.0	27,300.0	29,100.0	21,700.0	17,600.0
Total	555,000.0	643,800.0	725,600.0	749,700.0	243,700.0	250,600.0	303,200.0	302,200.0	124,800.0	145,400.0	143,200.0	141,200.0	126,100.0	168,700.0	206,100.0	236,300.0	60,400.0	79,100.0	73,100.0	70,000.0

Table 3.31—*Annual mortality of growing stock on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976—Cont'd.*

[Thousand cubic feet]

Section, region and species group	All ownerships 1976	All ownerships 1970	All ownerships 1962	All ownerships 1952	National Forest 1976	National Forest 1970	National Forest 1962	National Forest 1952	Other public 1976	Other public 1970	Other public 1962	Other public 1952	Forest industry 1976	Forest industry 1970	Forest industry 1962	Forest industry 1952	Farmer and other private 1976	Farmer and other private 1970	Farmer and other private 1962	Farmer and other private 1952
Pine subregion (Eastern Oregon and eastern Washington):																				
Softwoods	215,200.0	248,200.0	243,100.0	252,200.0	89,500.0	122,800.0	120,900.0	110,900.0	58,600.0	56,900.0	57,800.0	82,100.0	33,800.0	34,400.0	34,200.0	31,600.0	33,300.0	34,100.0	30,200.0	27,600.0
Hardwoods	1,200.0	1,500.0	1,600.0	1,100.0	100.0	200.0	300.0	300.0	700.0	700.0	700.0	400.0	.0	.0	.0	100.0	400.0	600.0	600.0	300.0
Total	216,400.0	249,700.0	244,700.0	253,300.0	89,600.0	123,000.0	121,200.0	111,200.0	59,300.0	57,600.0	58,500.0	82,500.0	33,800.0	34,400.0	34,200.0	31,700.0	33,700.0	34,700.0	30,800.0	27,900.0
Coastal Alaska:																				
Softwoods	158,300.0	170,600.0	176,200.0	183,200.0	146,799.0	158,692.0	164,133.0	171,090.0	9,581.0	11,202.0	11,341.0	11,363.0	4.0	5.0	5.0	.0	1,916.0	701.0	721.0	747.0
Hardwoods	2,495.0	2,556.0	2,567.0	2,567.0	1,536.0	1,597.0	1,608.0	1,608.0	956.0	956.0	956.0	956.0	.0	.0	.0	.0	3.0	3.0	3.0	3.0
Total	160,795.0	173,156.0	178,767.0	185,767.0	148,335.0	160,289.0	165,741.0	172,698.0	10,537.0	12,158.0	12,297.0	12,319.0	4.0	5.0	5.0	.0	1,919.0	704.0	724.0	750.0
Interior Alaska:																				
Softwoods	7,539.0	7,539.0	7,539.0	7,539.0	.0	.0	.0	.0	7,167.0	7,167.0	7,167.0	7,167.0	.0	.0	.0	.0	372.0	372.0	372.0	372.0
Hardwoods	2,490.0	2,490.0	2,490.0	2,490.0	.0	.0	.0	.0	2,367.0	2,367.0	2,367.0	2,367.0	.0	.0	.0	.0	123.0	123.0	123.0	123.0
Total	10,029.0	10,029.0	10,029.0	10,029.0	.0	.0	.0	.0	9,534.0	9,534.0	9,534.0	9,534.0	.0	.0	.0	.0	495.0	495.0	495.0	495.0
Total, Pacific Northwest:																				
Softwoods	865,439.0	1,003,539.0	1,090,039.0	1,143,239.0	473,499.0	525,792.0	581,533.0	578,390.0	188,948.0	210,769.0	203,408.0	228,530.0	134,304.0	181,805.0	222,405.0	255,200.0	68,688.0	85,173.0	82,693.0	81,119.0
Hardwoods	76,785.0	73,146.0	69,057.0	55,557.0	8,136.0	8,097.0	8,608.0	7,708.0	15,223.0	13,923.0	20,123.0	17,023.0	25,600.0	21,300.0	17,900.0	12,800.0	27,826.0	29,826.0	22,426.0	18,026.0
Total	942,224.0	1,076,685.0	1,159,096.0	1,198,796.0	481,635.0	533,889.0	590,141.0	586,098.0	204,171.0	224,692.0	223,531.0	245,553.0	159,904.0	203,105.0	240,305.0	268,000.0	96,514.0	114,999.0	105,119.0	99,145.0
Pacific Southwest:																				
Softwoods	137,700.0	168,600.0	346,100.0	366,800.0	80,800.0	103,600.0	198,100.0	199,500.0	5,100.0	7,000.0	12,800.0	16,500.0	20,600.0	25,000.0	48,000.0	53,500.0	31,200.0	33,000.0	87,200.0	97,300.0
Hardwoods	6,792.0	9,792.0	10,200.0	10,100.0	2,300.0	4,300.0	7,000.0	7,400.0	870.0	670.0	300.0	300.0	1,700.0	2,000.0	1,500.0	1,100.0	1,922.0	2,822.0	1,400.0	1,300.0
Total	144,492.0	178,392.0	356,300.0	376,900.0	83,100.0	107,900.0	205,100.0	206,900.0	5,970.0	7,670.0	13,100.0	16,800.0	22,300.0	27,000.0	49,500.0	54,600.0	33,122.0	35,822.0	88,600.0	98,600.0
Total, Pacific Coast:																				
Softwoods	1,003,139.0	1,172,139.0	1,436,139.0	1,510,039.0	554,299.0	629,392.0	779,633.0	777,890.0	194,048.0	217,769.0	216,208.0	245,030.0	154,904.0	206,805.0	270,405.0	308,700.0	99,888.0	118,173.0	169,893.0	178,419.0
Hardwoods	83,577.0	82,938.0	79,257.0	65,657.0	10,436.0	12,397.0	15,608.0	15,108.0	16,093.0	14,593.0	20,423.0	17,323.0	27,300.0	23,300.0	19,400.0	13,900.0	29,748.0	32,648.0	23,826.0	19,326.0
Total	1,086,716.0	1,255,077.0	1,515,396.0	1,575,696.0	564,735.0	641,789.0	795,241.0	792,998.0	210,141.0	232,362.0	236,631.0	262,353.0	182,204.0	230,105.0	289,805.0	322,600.0	129,636.0	150,821.0	193,719.0	197,745.0
Northern Rocky Mtn.:																				
Softwoods	294,912.0	360,571.0	402,800.0	375,600.0	186,121.0	251,771.0	299,000.0	277,800.0	38,513.0	38,471.0	36,508.0	34,550.0	22,164.0	22,154.0	21,653.0	20,878.0	48,114.0	48,175.0	45,639.0	42,372.0
Hardwoods	4,362.0	4,785.0	4,500.0	4,100.0	853.0	1,285.0	1,300.0	1,100.0	1,189.0	1,188.0	1,063.0	993.0	354.0	354.0	332.0	329.0	1,966.0	1,958.0	1,805.0	1,678.0
Total	299,274.0	365,356.0	407,300.0	379,700.0	186,974.0	253,056.0	300,300.0	278,900.0	39,702.0	39,659.0	37,571.0	35,543.0	22,518.0	22,508.0	21,985.0	21,207.0	50,080.0	50,133.0	47,444.0	44,050.0
Southern Rocky Mtn.:																				
Softwoods	163,649.0	184,748.0	199,100.0	192,900.0	87,849.0	108,948.0	122,600.0	113,400.0	28,253.0	28,253.0	29,460.0	31,858.0	267.0	1,326.0	1,310.0	1,328.0	47,280.0	46,221.0	45,730.0	46,314.0
Hardwoods	34,807.0	41,200.0	34,400.0	30,500.0	17,007.0	23,400.0	18,200.0	16,100.0	5,521.0	5,521.0	5,044.0	4,450.0	5.0	147.0	132.0	112.0	12,274.0	12,132.0	11,024.0	9,838.0
Total	198,456.0	225,948.0	233,500.0	223,400.0	104,856.0	132,348.0	140,800.0	129,500.0	33,774.0	33,774.0	34,504.0	36,308.0	272.0	1,473.0	1,442.0	1,440.0	59,554.0	58,353.0	56,754.0	56,152.0
Total, Rocky Mtn.:																				
Softwoods	458,561.0	545,319.0	601,900.0	568,500.0	273,970.0	360,719.0	421,600.0	391,200.0	66,766.0	66,724.0	65,968.0	66,408.0	22,431.0	23,480.0	22,963.0	22,206.0	95,394.0	94,396.0	91,369.0	88,686.0
Hardwoods	39,169.0	45,985.0	38,900.0	34,600.0	17,860.0	24,685.0	19,500.0	17,200.0	6,710.0	6,709.0	6,107.0	5,443.0	359.0	501.0	464.0	441.0	14,240.0	14,090.0	12,829.0	11,516.0
Total	497,730.0	591,304.0	640,800.0	603,100.0	291,830.0	385,404.0	441,100.0	408,400.0	73,476.0	73,433.0	72,075.0	71,851.0	22,790.0	23,981.0	23,427.0	22,647.0	109,634.0	108,486.0	104,198.0	100,202.0
Total, all regions:																				
Softwoods	2,302,574.0	2,476,165.0	2,730,288.0	2,627,673.0	887,255.0	1,056,305.0	1,259,035.0	1,212,831.0	328,865.0	344,916.0	343,021.0	352,098.0	376,256.0	406,997.0	458,526.0	460,038.0	710,198.0	667,947.0	669,706.0	602,706.0
Hardwoods	1,622,323.0	1,501,596.0	1,561,251.0	1,238,571.0	114,089.0	121,578.0	116,211.0	91,362.0	194,656.0	168,261.0	146,658.0	102,040.0	217,151.0	195,292.0	206,147.0	153,333.0	1,096,427.0	1,016,465.0	1,092,235.0	891,836.0
Total	3,924,897.0	3,977,761.0	4,291,539.0	3,866,244.0	1,001,344.0	1,177,883.0	1,375,246.0	1,304,193.0	523,521.0	513,177.0	489,679.0	454,138.0	593,407.0	602,289.0	664,673.0	613,371.0	1,806,625.0	1,684,412.0	1,761,941.0	1,494,542.0

Table 3.32—*Annual mortality of sawtimber on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976*

[Thousand board feet, International 1/4-inch log rule]

Section, region and species group	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952
New England:																				
Softwoods	204,652.0	261,856.0	191,000.0	169,000.0	1,295.0	6,669.0	5,745.0	5,330.0	3,570.0	5,757.0	4,857.0	4,192.0	78,887.0	101,786.0	56,153.0	49,938.0	120,900.0	147,644.0	124,245.0	109,540.0
Hardwoods	105,481.0	145,571.0	109,000.0	110,000.0	2,595.0	10,219.0	9,625.0	10,650.0	7,057.0	4,065.0	2,755.0	2,663.0	36,234.0	49,102.0	27,354.0	27,195.0	59,595.0	82,185.0	69,266.0	69,492.0
Total	310,133.0	407,427.0	300,000.0	279,000.0	3,890.0	16,888.0	15,370.0	15,980.0	10,627.0	9,822.0	7,612.0	6,855.0	115,121.0	150,888.0	83,507.0	77,133.0	180,495.0	229,829.0	193,511.0	179,032.0
Middle Atlantic:																				
Softwoods	90,493.0	91,071.0	82,000.0	73,000.0	3,646.0	2,862.0	2,500.0	2,300.0	6,510.0	6,408.0	5,700.0	5,100.0	9,650.0	7,841.0	7,159.0	6,333.0	70,687.0	73,960.0	66,641.0	59,267.0
Hardwoods	326,768.0	312,446.0	266,000.0	219,000.0	14,237.0	11,848.0	9,700.0	7,800.0	27,592.0	29,863.0	24,900.0	19,600.0	27,735.0	25,244.0	21,659.0	17,866.0	257,204.0	245,491.0	209,741.0	173,734.0
Total	417,261.0	403,517.0	348,000.0	292,000.0	17,883.0	14,710.0	12,200.0	10,100.0	34,102.0	36,271.0	30,600.0	24,700.0	37,385.0	33,085.0	28,818.0	24,199.0	327,891.0	319,451.0	276,382.0	233,001.0
Lake States:																				
Softwoods	270,242.0	238,624.0	212,803.0	114,472.0	21,278.0	28,128.0	29,090.0	18,971.0	73,353.0	69,198.0	63,265.0	36,766.0	61,724.0	48,179.0	43,639.0	18,358.0	113,887.0	93,119.0	76,809.0	40,377.0
Hardwoods	741,179.0	592,868.0	524,005.0	264,564.0	35,551.0	34,974.0	30,555.0	13,879.0	171,685.0	132,315.0	107,406.0	53,774.0	89,822.0	79,474.0	74,383.0	31,739.0	444,121.0	346,105.0	311,661.0	165,172.0
Total	1,011,421.0	831,492.0	736,808.0	379,036.0	56,829.0	63,102.0	59,645.0	32,850.0	245,038.0	201,513.0	170,671.0	90,540.0	151,546.0	127,653.0	118,022.0	50,097.0	558,008.0	439,224.0	388,470.0	205,549.0
Central States:																				
Softwoods	16,922.0	11,393.0	8,974.0	8,610.0	3,042.0	2,801.0	2,250.0	1,928.0	588.0	814.0	614.0	610.0	339.0	254.0	219.0	213.0	12,953.0	7,524.0	5,891.0	5,859.0
Hardwoods	330,058.0	353,240.0	366,152.0	339,890.0	9,380.0	11,837.0	10,814.0	10,121.0	14,834.0	14,722.0	14,387.0	11,841.0	3,864.0	4,880.0	3,886.0	3,621.0	301,980.0	321,801.0	337,065.0	314,307.0
Total	346,980.0	364,633.0	375,126.0	348,500.0	12,422.0	14,638.0	13,064.0	12,049.0	15,422.0	15,536.0	15,001.0	12,451.0	4,203.0	5,134.0	4,105.0	3,834.0	314,933.0	329,325.0	342,956.0	320,166.0
Total, North:																				
Softwoods	582,309.0	602,944.0	494,777.0	365,082.0	29,261.0	40,460.0	39,585.0	28,529.0	84,021.0	82,177.0	74,436.0	46,668.0	150,600.0	158,060.0	107,170.0	74,842.0	318,427.0	322,247.0	273,586.0	215,043.0
Hardwoods	1,503,486.0	1,404,125.0	1,265,157.0	933,454.0	61,763.0	68,878.0	60,694.0	42,450.0	221,168.0	180,965.0	149,448.0	87,878.0	157,655.0	158,700.0	127,282.0	80,421.0	1,062,900.0	995,582.0	927,733.0	722,705.0
Total	2,085,795.0	2,007,069.0	1,759,934.0	1,298,536.0	91,024.0	109,338.0	100,279.0	70,979.0	305,189.0	263,142.0	223,884.0	134,546.0	308,255.0	316,760.0	234,452.0	155,263.0	1,381,327.0	1,317,829.0	1,201,319.0	937,748.0
South Atlantic:																				
Softwoods	376,478.0	304,435.0	244,339.0	296,000.0	25,063.0	20,595.0	12,633.0	17,900.0	20,422.0	15,575.0	13,159.0	9,700.0	54,234.0	44,936.0	58,431.0	50,900.0	276,759.0	223,329.0	160,116.0	217,500.0
Hardwoods	430,580.0	390,459.0	468,000.0	447,000.0	44,487.0	40,681.0	35,300.0	30,000.0	26,687.0	24,990.0	13,000.0	8,500.0	50,027.0	45,990.0	63,400.0	61,400.0	309,379.0	278,798.0	356,300.0	347,100.0
Total	807,058.0	694,894.0	712,339.0	743,000.0	69,550.0	61,276.0	47,933.0	47,900.0	47,109.0	40,565.0	26,159.0	18,200.0	104,261.0	90,926.0	121,831.0	112,300.0	586,138.0	502,127.0	516,416.0	564,600.0
East Gulf:																				
Softwoods	316,418.0	287,194.0	301,000.0	268,000.0	17,997.0	16,492.0	11,800.0	14,800.0	16,485.0	14,909.0	32,000.0	20,100.0	60,693.0	55,167.0	53,200.0	58,300.0	221,243.0	200,626.0	204,000.0	174,800.0
Hardwoods	319,655.0	304,067.0	328,000.0	334,000.0	22,978.0	21,707.0	32,700.0	22,600.0	10,512.0	10,030.0	11,100.0	8,600.0	61,205.0	58,630.0	64,800.0	67,000.0	224,960.0	213,700.0	219,400.0	235,800.0
Total	636,073.0	591,261.0	629,000.0	602,000.0	40,975.0	38,199.0	44,500.0	37,400.0	26,997.0	24,939.0	43,100.0	28,700.0	121,898.0	113,797.0	118,000.0	125,300.0	446,203.0	414,326.0	423,400.0	410,600.0
Central Gulf:																				
Softwoods	332,653.0	218,110.0	218,000.0	137,300.0	38,447.0	25,550.0	24,900.0	16,000.0	15,993.0	7,583.0	6,000.0	5,900.0	74,779.0	56,587.0	58,900.0	43,200.0	203,434.0	128,390.0	128,200.0	72,200.0
Hardwoods	421,161.0	322,678.0	511,000.0	516,300.0	14,110.0	11,668.0	19,600.0	12,700.0	18,993.0	16,403.0	14,400.0	12,000.0	71,200.0	51,064.0	69,300.0	61,100.0	316,858.0	243,543.0	407,700.0	430,500.0
Total	753,814.0	540,788.0	729,000.0	653,600.0	52,557.0	37,218.0	44,500.0	28,700.0	34,986.0	23,986.0	20,400.0	17,900.0	145,979.0	107,651.0	128,200.0	104,300.0	520,292.0	371,933.0	535,900.0	502,700.0
West Gulf:																				
Softwoods	286,003.0	259,665.0	260,000.0	182,000.0	24,825.0	37,986.0	40,700.0	23,800.0	5,870.0	2,600.0	3,300.0	2,200.0	142,781.0	113,510.0	129,200.0	99,200.0	112,527.0	105,569.0	86,800.0	56,800.0
Hardwoods	444,291.0	430,672.0	793,000.0	446,000.0	15,151.0	19,176.0	30,300.0	16,900.0	33,749.0	19,991.0	23,300.0	11,000.0	101,152.0	102,913.0	157,700.0	81,300.0	294,239.0	288,592.0	581,700.0	336,800.0
Total	730,294.0	690,337.0	1,053,000.0	628,000.0	39,976.0	57,162.0	71,000.0	40,700.0	39,619.0	22,591.0	26,600.0	13,200.0	243,933.0	216,423.0	286,900.0	180,500.0	406,766.0	394,161.0	668,500.0	393,600.0
Total, South:																				
Softwoods	1,311,552.0	1,069,404.0	1,023,339.0	883,300.0	106,332.0	100,623.0	90,033.0	72,500.0	58,770.0	40,667.0	54,459.0	37,900.0	332,487.0	270,200.0	299,731.0	251,600.0	813,963.0	657,914.0	579,116.0	521,300.0
Hardwoods	1,615,687.0	1,447,876.0	2,100,000.0	1,743,300.0	96,726.0	93,232.0	117,900.0	82,200.0	89,941.0	71,414.0	61,800.0	40,100.0	283,584.0	258,597.0	355,200.0	270,800.0	1,145,436.0	1,024,633.0	1,565,100.0	1,350,200.0
Total	2,927,239.0	2,517,280.0	3,123,339.0	2,626,600.0	203,058.0	193,855.0	207,933.0	154,700.0	148,711.0	112,081.0	116,259.0	78,000.0	616,071.0	528,797.0	654,931.0	522,400.0	1,959,399.0	1,682,547.0	2,144,216.0	1,871,500.0
Pacific Northwest: Douglas-fir subregion (Western Oregon and western Washington):																				
Softwoods	2,538,500.0	3,097,100.0	3,776,800.0	4,107,100.0	1,249,800.0	1,399,300.0	1,746,200.0	1,772,900.0	617,200.0	722,700.0	713,900.0	734,400.0	528,600.0	769,900.0	1,093,200.0	1,356,800.0	142,900.0	205,200.0	223,500.0	243,000.0
Hardwoods	190,700.0	195,700.0	191,900.0	158,800.0	35,800.0	35,000.0	35,300.0	30,300.0	34,100.0	22,000.0	47,500.0	40,200.0	54,800.0	56,900.0	51,100.0	38,600.0	66,000.0	81,800.0	58,000.0	49,700.0
Total	2,729,200.0	3,292,800.0	3,968,700.0	4,265,900.0	1,285,600.0	1,434,300.0	1,781,500.0	1,803,200.0	651,300.0	744,700.0	761,400.0	774,600.0	583,400.0	826,800.0	1,144,300.0	1,395,400.0	208,900.0	287,000.0	281,500.0	292,700.0

Table 3.32—*Annual mortality of sawtimber on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976—Cont'd.*

[Thousand board feet, International 1/4-inch log rule]

Section, region and species group	All ownerships 1976	All ownerships 1970	All ownerships 1962	All ownerships 1952	National Forest 1976	National Forest 1970	National Forest 1962	National Forest 1952	Other public 1976	Other public 1970	Other public 1962	Other public 1952	Forest industry 1976	Forest industry 1970	Forest industry 1962	Forest industry 1952	Farmer and other private 1976	Farmer and other private 1970	Farmer and other private 1962	Farmer and other private 1952
Pine subregion (Eastern Oregon and eastern Washington):																				
Softwoods	930,700.0	1,055,400.0	1,048,100.0	1,208,400.0	409,300.0	582,000.0	577,700.0	562,800.0	274,000.0	245,000.0	249,300.0	372,800.0	138,000.0	130,000.0	134,100.0	158,000.0	109,400.0	98,400.0	87,000.0	114,800.0
Hardwoods	1,000.0	1,400.0	1,500.0	2,500.0	400.0	800.0	900.0	700.0	.0	.0	.0	1,200.0	.0	.0	.0	200.0	600.0	600.0	600.0	400.0
Total	931,700.0	1,056,800.0	1,049,600.0	1,210,900.0	409,700.0	582,800.0	578,600.0	563,500.0	274,000.0	245,000.0	249,300.0	374,000.0	138,000.0	130,000.0	134,100.0	158,200.0	110,000.0	99,000.0	87,600.0	115,200.0
Coastal Alaska:																				
Softwoods	748,000.0	807,000.0	836,000.0	872,000.0	693,655.0	750,672.0	778,747.0	814,357.0	45,272.0	52,991.0	53,808.0	54,089.0	21.0	22.0	23.0	.0	9,052.0	3,315.0	3,422.0	3,554.0
Hardwoods	8,793.0	9,005.0	9,045.0	9,045.0	5,415.0	5,627.0	5,667.0	5,667.0	3,369.0	3,369.0	3,369.0	3,369.0	.0	.0	.0	.0	9.0	9.0	9.0	9.0
Total	756,793.0	816,005.0	845,045.0	881,045.0	699,070.0	756,299.0	784,414.0	820,024.0	48,641.0	56,360.0	57,177.0	57,458.0	21.0	22.0	23.0	.0	9,061.0	3,324.0	3,431.0	3,563.0
Interior Alaska:																				
Softwoods	30,640.0	30,640.0	30,640.0	30,640.0	.0	.0	.0	.0	29,130.0	29,130.0	29,130.0	29,130.0	.0	.0	.0	.0	1,510.0	1,510.0	1,510.0	1,510.0
Hardwoods	2,210.0	2,210.0	2,210.0	2,210.0	.0	.0	.0	.0	2,100.0	2,100.0	2,100.0	2,100.0	.0	.0	.0	.0	110.0	110.0	110.0	110.0
Total	32,850.0	32,850.0	32,850.0	32,850.0	.0	.0	.0	.0	31,230.0	31,230.0	31,230.0	31,230.0	.0	.0	.0	.0	1,620.0	1,620.0	1,620.0	1,620.0
Total, Pacific Northwest:																				
Softwoods	4,247,840.0	4,990,140.0	5,691,540.0	6,218,140.0	2,352,755.0	2,731,972.0	3,102,647.0	3,150,057.0	965,602.0	1,049,821.0	1,046,138.0	1,190,419.0	666,621.0	899,922.0	1,227,323.0	1,514,800.0	262,862.0	308,425.0	315,432.0	362,864.0
Hardwoods	202,703.0	208,315.0	204,655.0	172,555.0	41,615.0	41,427.0	41,867.0	36,667.0	39,569.0	27,469.0	52,969.0	46,869.0	54,800.0	56,900.0	51,100.0	38,800.0	66,719.0	82,519.0	58,719.0	50,219.0
Total	4,450,543.0	5,198,455.0	5,896,195.0	6,390,695.0	2,394,370.0	2,773,399.0	3,144,514.0	3,186,724.0	1,005,171.0	1,077,290.0	1,099,107.0	1,237,288.0	721,421.0	956,822.0	1,278,423.0	1,553,600.0	329,581.0	390,944.0	374,151.0	413,083.0
Pacific Southwest:																				
Softwoods	776,500.0	915,500.0	1,727,500.0	1,936,000.0	479,500.0	576,500.0	1,077,500.0	1,118,000.0	27,700.0	43,000.0	67,000.0	93,000.0	104,900.0	128,000.0	211,000.0	260,000.0	164,400.0	168,000.0	372,000.0	465,000.0
Hardwoods	25,188.0	29,388.0	22,600.0	22,200.0	7,900.0	9,900.0	14,500.0	14,800.0	4,982.0	5,382.0	1,000.0	1,200.0	4,800.0	4,000.0	3,600.0	2,800.0	7,506.0	10,106.0	3,500.0	3,400.0
Total	801,688.0	944,888.0	1,750,100.0	1,958,200.0	487,400.0	586,400.0	1,092,000.0	1,132,800.0	32,682.0	48,382.0	68,000.0	94,200.0	109,700.0	132,000.0	214,600.0	262,800.0	171,906.0	178,106.0	375,500.0	468,400.0
Total, Pacific Coast:																				
Softwoods	5,024,340.0	5,905,640.0	7,419,040.0	8,154,140.0	2,832,255.0	3,308,472.0	4,180,147.0	4,268,057.0	993,302.0	1,092,821.0	1,113,138.0	1,283,419.0	771,521.0	1,027,922.0	1,438,323.0	1,774,800.0	427,262.0	476,425.0	687,432.0	827,864.0
Hardwoods	227,891.0	237,703.0	227,255.0	194,755.0	49,515.0	51,327.0	56,367.0	51,467.0	44,551.0	32,851.0	53,969.0	48,069.0	59,600.0	60,900.0	54,700.0	41,600.0	74,225.0	92,625.0	62,219.0	53,619.0
Total	5,252,231.0	6,143,343.0	7,646,295.0	8,348,895.0	2,881,770.0	3,359,799.0	4,236,514.0	4,319,524.0	1,037,853.0	1,125,672.0	1,167,107.0	1,331,488.0	831,121.0	1,088,822.0	1,493,023.0	1,816,400.0	501,487.0	569,050.0	749,651.0	881,483.0
Northern Rocky Mtn.:																				
Softwoods	1,178,774.0	1,600,387.0	1,685,000.0	1,629,000.0	764,573.0	1,186,387.0	1,272,000.0	1,219,000.0	152,302.0	152,026.0	150,993.0	151,523.0	98,170.0	98,122.0	100,500.0	100,932.0	163,729.0	163,852.0	161,507.0	157,545.0
Hardwoods	11,717.0	14,213.0	12,000.0	12,000.0	691.0	3,213.0	2,000.0	2,000.0	3,621.0	3,620.0	3,220.0	3,220.0	1,441.0	1,440.0	1,412.0	1,412.0	5,964.0	5,940.0	5,368.0	5,368.0
Total	1,190,491.0	1,614,600.0	1,697,000.0	1,641,000.0	765,264.0	1,189,600.0	1,274,000.0	1,221,000.0	155,923.0	155,646.0	154,213.0	154,743.0	99,611.0	99,562.0	101,912.0	102,344.0	169,693.0	169,792.0	166,875.0	162,913.0
Southern Rocky Mtn.:																				
Softwoods	667,864.0	765,143.0	841,000.0	847,000.0	371,864.0	469,143.0	528,000.0	504,000.0	116,075.0	116,075.0	126,991.0	145,067.0	981.0	5,049.0	5,269.0	5,685.0	178,944.0	174,876.0	180,740.0	192,248.0
Hardwoods	64,470.0	79,025.0	61,000.0	59,000.0	36,470.0	51,025.0	35,000.0	34,000.0	7,974.0	7,974.0	7,480.0	7,169.0	4.0	396.0	395.0	346.0	20,022.0	19,630.0	18,125.0	17,485.0
Total	732,334.0	844,168.0	902,000.0	906,000.0	408,334.0	520,168.0	563,000.0	538,000.0	124,049.0	124,049.0	134,471.0	152,236.0	985.0	5,445.0	5,664.0	6,031.0	198,966.0	194,506.0	198,865.0	209,733.0
Total, Rocky Mtn.:																				
Softwoods	1,846,638.0	2,365,530.0	2,526,000.0	2,476,000.0	1,136,437.0	1,655,530.0	1,800,000.0	1,723,000.0	268,377.0	268,101.0	277,984.0	296,590.0	99,151.0	103,171.0	105,769.0	106,617.0	342,673.0	338,728.0	342,247.0	349,793.0
Hardwoods	76,187.0	93,238.0	73,000.0	71,000.0	37,161.0	54,238.0	37,000.0	36,000.0	11,595.0	11,594.0	10,700.0	10,389.0	1,445.0	1,836.0	1,807.0	1,758.0	25,986.0	25,570.0	23,493.0	22,853.0
Total	1,922,825.0	2,458,768.0	2,599,000.0	2,547,000.0	1,173,598.0	1,709,768.0	1,837,000.0	1,759,000.0	279,972.0	279,695.0	288,684.0	306,979.0	100,596.0	105,007.0	107,576.0	108,375.0	368,659.0	364,298.0	365,740.0	372,646.0
Total, all regions:																				
Softwoods	8,764,839.0	9,943,518.0	11,463,156.0	11,878,522.0	4,104,285.0	5,105,085.0	6,109,765.0	6,092,086.0	1,404,470.0	1,483,766.0	1,520,017.0	1,664,577.0	1,353,759.0	1,559,353.0	1,950,993.0	2,207,859.0	1,902,325.0	1,795,314.0	1,882,381.0	1,914,000.0
Hardwoods	3,423,251.0	3,182,942.0	3,665,412.0	2,942,509.0	245,165.0	267,675.0	271,961.0	212,117.0	367,255.0	296,824.0	275,917.0	186,436.0	502,284.0	480,033.0	538,989.0	394,579.0	2,308,547.0	2,138,410.0	2,578,545.0	2,149,377.0
Total	12,188,090.0	13,126,460.0	15,128,568.0	14,821,031.0	4,349,450.0	5,372,760.0	6,381,726.0	6,304,203.0	1,771,725.0	1,780,590.0	1,795,934.0	1,851,013.0	1,856,043.0	2,039,386.0	2,489,982.0	2,602,438.0	4,210,872.0	3,933,724.0	4,460,926.0	4,063,377.0

Table 3.33—*Net annual growth of growing stock on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976*

[Thousand cubic feet]

Section, region and species group	All ownerships 1976	1970	1962	1952	National Forest 1976	1970	1962	1952	Other public 1976	1970	1962	1952	Forest industry 1976	1970	1962	1952	Farmer and other private 1976	1970	1962	1952
New England:																				
Softwoods	838,200.0	710,818.0	645,700.0	490,500.0	11,988.0	11,347.0	11,294.0	9,682.0	26,244.0	15,349.0	12,176.0	9,366.0	356,201.0	327,146.0	225,061.0	168,813.0	443,767.0	356,976.0	397,169.0	302,639.0
Hardwoods	506,431.0	367,087.0	397,200.0	302,800.0	22,184.0	17,481.0	18,106.0	14,843.0	36,578.0	17,303.0	21,616.0	14,864.0	118,934.0	96,997.0	76,261.0	64,909.0	328,735.0	235,306.0	281,217.0	208,184.0
Total	1,344,631.0	1,077,905.0	1,042,900.0	793,300.0	34,172.0	28,828.0	29,400.0	24,525.0	62,822.0	32,652.0	33,792.0	24,230.0	475,135.0	424,143.0	301,322.0	233,722.0	772,502.0	592,282.0	678,386.0	510,823.0
Middle Atlantic:																				
Softwoods	229,071.0	190,898.0	176,200.0	162,100.0	6,371.0	4,743.0	4,100.0	3,600.0	22,547.0	21,163.0	19,500.0	17,800.0	21,158.0	11,822.0	11,038.0	10,115.0	178,995.0	153,170.0	141,562.0	130,585.0
Hardwoods	1,566,140.0	1,605,813.0	1,324,700.0	1,055,200.0	94,815.0	87,246.0	69,900.0	54,600.0	201,322.0	192,753.0	160,300.0	127,400.0	107,230.0	95,877.0	79,735.0	63,665.0	1,162,773.0	1,229,937.0	1,014,765.0	809,535.0
Total	1,795,211.0	1,796,711.0	1,500,900.0	1,217,300.0	101,186.0	91,989.0	74,000.0	58,200.0	223,869.0	213,916.0	179,800.0	145,200.0	128,388.0	107,699.0	90,773.0	73,780.0	1,341,768.0	1,383,107.0	1,156,327.0	940,120.0
Lake States:																				
Softwoods	463,444.0	412,007.0	368,868.0	303,302.0	89,341.0	67,614.0	66,424.0	50,354.0	139,517.0	125,403.0	119,539.0	91,743.0	53,635.0	61,591.0	43,043.0	43,113.0	180,951.0	157,399.0	139,862.0	118,092.0
Hardwoods	1,153,963.0	1,084,567.0	978,417.0	861,388.0	124,964.0	108,823.0	109,012.0	85,572.0	277,770.0	252,361.0	250,267.0	198,372.0	105,371.0	106,097.0	89,038.0	90,975.0	645,858.0	617,286.0	530,100.0	486,469.0
Total	1,617,407.0	1,496,574.0	1,347,285.0	1,164,690.0	214,305.0	176,437.0	175,436.0	135,926.0	417,287.0	377,764.0	369,806.0	290,115.0	159,006.0	167,688.0	132,081.0	134,088.0	826,809.0	774,685.0	669,962.0	604,561.0
Central States:																				
Softwoods	69,069.0	48,337.0	43,378.0	36,920.0	15,552.0	14,698.0	13,300.0	11,961.0	1,855.0	4,744.0	3,703.0	3,113.0	1,335.0	1,360.0	1,305.0	475.0	50,327.0	27,535.0	25,070.0	21,371.0
Hardwoods	965,434.0	868,223.0	806,507.0	772,600.0	54,341.0	47,267.0	45,809.0	38,154.0	41,552.0	37,297.0	30,298.0	24,048.0	20,943.0	20,922.0	18,860.0	14,482.0	848,598.0	762,737.0	711,540.0	695,916.0
Total	1,034,503.0	916,560.0	849,885.0	809,520.0	69,893.0	61,965.0	59,109.0	50,115.0	43,407.0	42,041.0	34,001.0	27,161.0	22,278.0	22,282.0	20,165.0	14,957.0	898,925.0	790,272.0	736,610.0	717,287.0
Total, North:																				
Softwoods	1,599,784.0	1,362,060.0	1,234,146.0	992,822.0	123,252.0	98,402.0	95,118.0	75,597.0	190,163.0	166,659.0	154,918.0	122,022.0	432,329.0	401,919.0	280,447.0	222,516.0	854,040.0	695,080.0	703,663.0	572,687.0
Hardwoods	4,191,968.0	3,925,690.0	3,506,824.0	2,991,988.0	296,304.0	260,817.0	242,827.0	193,169.0	557,222.0	499,714.0	462,481.0	364,684.0	352,478.0	319,893.0	263,894.0	234,031.0	2,985,964.0	2,845,266.0	2,537,622.0	2,200,104.0
Total	5,791,752.0	5,287,750.0	4,740,970.0	3,984,810.0	419,556.0	359,219.0	337,945.0	268,766.0	747,385.0	666,373.0	617,399.0	486,706.0	784,807.0	721,812.0	544,341.0	456,547.0	3,840,004.0	3,540,346.0	3,241,285.0	2,772,791.0
South Atlantic:																				
Softwoods	1,264,642.0	1,175,374.0	994,167.0	922,417.0	61,529.0	57,750.0	40,997.0	43,013.0	54,635.0	50,612.0	36,954.0	30,917.0	218,229.0	197,436.0	141,152.0	156,383.0	930,249.0	869,576.0	775,064.0	692,104.0
Hardwoods	1,483,163.0	1,307,726.0	1,004,582.0	862,716.0	103,042.0	90,842.0	69,611.0	57,867.0	43,657.0	38,098.0	20,373.0	16,335.0	139,014.0	125,050.0	96,769.0	100,343.0	1,197,450.0	1,053,736.0	817,829.0	688,171.0
Total	2,747,805.0	2,483,100.0	1,998,749.0	1,785,133.0	164,571.0	148,592.0	110,608.0	100,880.0	98,292.0	88,710.0	57,327.0	47,252.0	357,243.0	322,486.0	237,921.0	256,726.0	2,127,699.0	1,923,312.0	1,592,893.0	1,380,275.0
East Gulf:																				
Softwoods	1,722,352.0	1,502,902.0	1,157,300.0	951,600.0	73,201.0	66,061.0	48,700.0	37,300.0	79,926.0	70,320.0	47,300.0	39,100.0	388,262.0	343,628.0	269,600.0	218,200.0	1,180,963.0	1,022,893.0	791,700.0	657,000.0
Hardwoods	603,519.0	524,472.0	463,487.0	428,902.0	30,968.0	26,760.0	16,833.0	15,341.0	15,912.0	13,888.0	11,999.0	10,834.0	105,234.0	92,526.0	77,136.0	70,454.0	451,405.0	391,298.0	357,519.0	332,273.0
Total	2,325,871.0	2,027,374.0	1,620,787.0	1,380,502.0	104,169.0	92,821.0	65,533.0	52,641.0	95,838.0	84,208.0	59,299.0	49,934.0	493,496.0	436,154.0	346,736.0	288,654.0	1,632,368.0	1,414,191.0	1,149,219.0	989,273.0
Central Gulf:																				
Softwoods	1,555,099.0	1,469,065.0	1,232,100.0	824,900.0	99,898.0	120,203.0	140,500.0	82,100.0	46,548.0	55,004.0	37,900.0	41,888.0	334,791.0	329,688.0	322,800.0	248,196.0	1,073,862.0	964,170.0	730,900.0	452,716.0
Hardwoods	1,354,920.0	1,172,396.0	983,200.0	864,500.0	58,845.0	51,596.0	47,800.0	24,965.0	51,631.0	49,039.0	35,100.0	30,682.0	184,404.0	143,947.0	121,500.0	82,122.0	1,060,040.0	927,814.0	778,800.0	726,731.0
Total	2,910,019.0	2,641,461.0	2,215,300.0	1,689,400.0	158,743.0	171,799.0	188,300.0	107,065.0	98,179.0	104,043.0	73,000.0	72,570.0	519,195.0	473,635.0	444,300.0	330,318.0	2,133,902.0	1,891,984.0	1,509,700.0	1,179,447.0
West Gulf:																				
Softwoods	1,615,964.0	1,457,972.0	1,296,200.0	926,200.0	138,833.0	187,383.0	190,400.0	124,600.0	24,456.0	19,941.0	17,400.0	12,400.0	559,357.0	558,920.0	648,200.0	459,000.0	893,318.0	691,728.0	440,200.0	330,200.0
Hardwoods	1,105,001.0	966,039.0	682,000.0	666,700.0	64,656.0	54,464.0	49,500.0	30,600.0	45,556.0	31,654.0	27,400.0	17,800.0	260,386.0	226,880.0	156,100.0	114,300.0	734,403.0	653,041.0	449,000.0	504,000.0
Total	2,720,965.0	2,424,011.0	1,978,200.0	1,592,900.0	203,489.0	241,847.0	239,900.0	155,200.0	70,012.0	51,595.0	44,800.0	30,200.0	819,743.0	785,800.0	804,300.0	573,300.0	1,627,721.0	1,344,769.0	889,200.0	834,200.0
Total, South:																				
Softwoods	6,158,057.0	5,605,313.0	4,679,767.0	3,625,117.0	373,461.0	431,397.0	420,597.0	287,013.0	205,565.0	195,877.0	139,554.0	124,305.0	1,500,639.0	1,429,672.0	1,381,752.0	1,081,779.0	4,078,392.0	3,548,367.0	2,737,864.0	2,132,020.0
Hardwoods	4,546,603.0	3,970,633.0	3,133,269.0	2,822,818.0	257,511.0	223,662.0	183,744.0	128,773.0	156,756.0	132,679.0	94,872.0	75,651.0	689,038.0	588,403.0	451,505.0	367,219.0	3,443,298.0	3,025,889.0	2,403,148.0	2,251,175.0
Total	10,704,660.0	9,575,946.0	7,813,036.0	6,447,935.0	630,972.0	655,059.0	604,341.0	415,786.0	362,321.0	328,556.0	234,426.0	199,956.0	2,189,677.0	2,018,075.0	1,833,257.0	1,448,998.0	7,521,690.0	6,574,256.0	5,141,012.0	4,383,195.0
Pacific Northwest: Douglas-fir subregion (Western Oregon and western Washington):																				
Softwoods	1,544,600.0	1,409,400.0	1,214,000.0	975,000.0	226,700.0	240,400.0	197,000.0	180,000.0	371,000.0	356,000.0	316,000.0	193,000.0	606,400.0	455,000.0	393,000.0	337,000.0	340,500.0	358,000.0	308,000.0	265,000.0
Hardwoods	397,000.0	382,900.0	299,000.0	219,000.0	13,600.0	13,900.0	14,000.0	13,000.0	92,400.0	91,000.0	57,000.0	33,000.0	144,700.0	124,000.0	98,000.0	75,000.0	146,300.0	154,000.0	130,000.0	98,000.0
Total	1,941,600.0	1,792,300.0	1,513,000.0	1,194,000.0	240,300.0	254,300.0	211,000.0	193,000.0	463,400.0	447,000.0	373,000.0	226,000.0	751,100.0	579,000.0	491,000.0	412,000.0	486,800.0	512,000.0	438,000.0	363,000.0

Table 3.33—*Net annual growth of growing stock on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976—Cont'd.*

[Thousand cubic feet]

Section, region and species group	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952
Pine subregion (Eastern Oregon and eastern Washington):																				
Softwoods	614,100.0	652,900.0	604,600.0	497,500.0	312,100.0	328,700.0	309,900.0	260,900.0	96,000.0	91,400.0	87,700.0	65,900.0	84,800.0	84,500.0	71,100.0	62,000.0	121,200.0	148,300.0	135,900.0	108,700.0
Hardwoods	3,800.0	3,400.0	3,300.0	2,500.0	1,100.0	800.0	800.0	600.0	600.0	700.0	700.0	500.0	500.0	400.0	400.0	300.0	1,600.0	1,500.0	1,400.0	1,100.0
Total	617,900.0	656,300.0	607,900.0	500,000.0	313,200.0	329,500.0	310,700.0	261,500.0	96,600.0	92,100.0	88,400.0	66,400.0	85,300.0	84,900.0	71,500.0	62,300.0	122,800.0	149,800.0	137,300.0	109,800.0
Coastal Alaska:																				
Softwoods	24,400.0	21,100.0	17,000.0	11,100.0	22,627.0	19,626.0	15,836.0	10,367.0	1,477.0	1,386.0	1,094.0	688.0	1.0	1.0	.0	.0	295.0	87.0	70.0	45.0
Hardwoods	24.0	25.0	25.0	25.0	15.0	16.0	16.0	16.0	9.0	9.0	9.0	9.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	24,424.0	21,125.0	17,025.0	11,125.0	22,642.0	19,642.0	15,852.0	10,383.0	1,486.0	1,395.0	1,103.0	697.0	1.0	1.0	.0	.0	295.0	87.0	70.0	45.0
Interior Alaska:																				
Softwoods	41,400.0	41,400.0	41,400.0	41,400.0	.0	.0	.0	.0	39,350.0	39,350.0	39,350.0	39,350.0	.0	.0	.0	.0	2,050.0	2,050.0	2,050.0	2,050.0
Hardwoods	60,690.0	60,690.0	60,690.0	60,690.0	.0	.0	.0	.0	57,690.0	57,690.0	57,690.0	57,690.0	.0	.0	.0	.0	3,000.0	3,000.0	3,000.0	3,000.0
Total	102,090.0	102,090.0	102,090.0	102,090.0	.0	.0	.0	.0	97,040.0	97,040.0	97,040.0	97,040.0	.0	.0	.0	.0	5,050.0	5,050.0	5,050.0	5,050.0
Total, Pacific Northwest:																				
Softwoods	2,224,500.0	2,124,800.0	1,877,000.0	1,525,000.0	561,427.0	588,726.0	522,736.0	451,267.0	507,827.0	488,136.0	444,144.0	298,938.0	691,201.0	539,501.0	464,100.0	399,000.0	464,045.0	508,437.0	446,020.0	375,795.0
Hardwoods	461,514.0	447,015.0	363,015.0	282,215.0	14,715.0	14,716.0	14,816.0	13,616.0	150,699.0	149,399.0	115,399.0	91,199.0	145,200.0	124,400.0	98,400.0	75,300.0	150,900.0	158,500.0	134,400.0	102,100.0
Total	2,686,014.0	2,571,815.0	2,240,015.0	1,807,215.0	576,142.0	603,442.0	537,552.0	464,883.0	658,526.0	637,535.0	559,543.0	390,137.0	836,401.0	663,901.0	562,500.0	474,300.0	614,945.0	666,937.0	580,420.0	477,895.0
Pacific Southwest:																				
Softwoods	713,200.0	698,400.0	499,600.0	444,000.0	363,500.0	338,400.0	185,600.0	162,000.0	13,900.0	14,000.0	14,000.0	14,000.0	138,500.0	135,000.0	108,000.0	90,000.0	197,300.0	211,000.0	192,000.0	178,000.0
Hardwoods	79,137.0	91,837.0	80,000.0	75,000.0	16,100.0	19,800.0	30,000.0	29,000.0	7,735.0	7,635.0	5,000.0	6,000.0	19,100.0	24,000.0	15,000.0	11,000.0	36,202.0	40,402.0	30,000.0	29,000.0
Total	792,337.0	790,237.0	579,600.0	519,000.0	379,600.0	358,200.0	215,600.0	191,000.0	21,635.0	21,635.0	19,000.0	20,000.0	157,600.0	159,000.0	123,000.0	101,000.0	233,502.0	251,402.0	222,000.0	207,000.0
Total, Pacific Coast:																				
Softwoods	2,937,700.0	2,823,200.0	2,376,600.0	1,969,000.0	924,927.0	927,126.0	708,336.0	613,267.0	521,727.0	502,136.0	458,144.0	312,938.0	829,701.0	674,501.0	572,100.0	489,000.0	661,345.0	719,437.0	638,020.0	553,795.0
Hardwoods	540,651.0	538,852.0	443,015.0	357,215.0	30,815.0	34,516.0	44,816.0	42,616.0	158,434.0	157,034.0	120,399.0	97,199.0	164,300.0	148,400.0	113,400.0	86,300.0	187,102.0	198,902.0	164,400.0	131,100.0
Total	3,478,351.0	3,362,052.0	2,819,615.0	2,326,215.0	955,742.0	961,642.0	753,152.0	655,883.0	680,161.0	659,170.0	578,543.0	410,137.0	994,001.0	822,901.0	685,500.0	575,300.0	848,447.0	918,339.0	802,420.0	684,895.0
Northern Rocky Mtn.:																				
Softwoods	1,264,379.0	1,140,544.0	972,200.0	853,700.0	798,338.0	675,144.0	562,000.0	500,800.0	130,735.0	130,401.0	115,043.0	98,608.0	103,240.0	103,001.0	90,301.0	77,467.0	232,066.0	231,998.0	204,856.0	176,825.0
Hardwoods	15,890.0	13,297.0	11,100.0	9,400.0	5,811.0	3,597.0	2,600.0	2,300.0	2,696.0	2,653.0	2,434.0	2,122.0	850.0	798.0	634.0	461.0	6,533.0	6,249.0	5,432.0	4,517.0
Total	1,280,269.0	1,153,841.0	983,300.0	863,100.0	804,149.0	678,741.0	564,600.0	503,100.0	133,431.0	133,054.0	117,477.0	100,730.0	104,090.0	103,799.0	90,935.0	77,928.0	238,599.0	238,247.0	210,288.0	181,342.0
Southern Rocky Mtn.:																				
Softwoods	324,821.0	308,277.0	280,400.0	243,000.0	245,521.0	228,977.0	213,000.0	186,800.0	29,599.0	29,599.0	24,745.0	20,007.0	398.0	1,655.0	1,380.0	1,170.0	49,303.0	48,046.0	41,275.0	35,023.0
Hardwoods	84,463.0	71,159.0	55,200.0	47,600.0	60,363.0	47,059.0	34,000.0	29,100.0	4,323.0	4,323.0	3,779.0	3,355.0	5.0	294.0	247.0	204.0	19,772.0	19,483.0	17,174.0	14,941.0
Total	409,284.0	379,436.0	335,600.0	290,600.0	305,884.0	276,036.0	247,000.0	215,900.0	33,922.0	33,922.0	28,524.0	23,362.0	403.0	1,949.0	1,627.0	1,374.0	69,075.0	67,529.0	58,449.0	49,964.0
Total, Rocky Mtn.:																				
Softwoods	1,589,200.0	1,448,821.0	1,252,600.0	1,096,700.0	1,043,859.0	904,121.0	775,000.0	687,600.0	160,334.0	160,000.0	139,788.0	118,615.0	103,638.0	104,656.0	91,681.0	78,637.0	281,369.0	280,044.0	246,131.0	211,848.0
Hardwoods	100,353.0	84,456.0	66,300.0	57,000.0	66,174.0	50,656.0	36,600.0	31,400.0	7,019.0	6,976.0	6,213.0	5,477.0	855.0	1,092.0	881.0	665.0	26,305.0	25,732.0	22,606.0	19,458.0
Total	1,689,553.0	1,533,277.0	1,318,900.0	1,153,700.0	1,110,033.0	954,777.0	811,600.0	719,000.0	167,353.0	166,976.0	146,001.0	124,092.0	104,493.0	105,748.0	92,562.0	79,302.0	307,674.0	305,776.0	268,737.0	231,306.0
Total, all regions:																				
Softwoods	12,284,741.0	11,239,394.0	9,543,113.0	7,683,639.0	2,465,499.0	2,361,046.0	1,999,051.0	1,663,477.0	1,077,789.0	1,024,672.0	892,404.0	677,880.0	2,866,307.0	2,610,748.0	2,325,980.0	1,871,932.0	5,875,146.0	5,242,928.0	4,325,678.0	3,470,350.0
Hardwoods	9,379,575.0	8,519,631.0	7,149,408.0	6,229,021.0	650,804.0	569,651.0	507,987.0	395,958.0	879,431.0	796,403.0	683,965.0	543,011.0	1,206,671.0	1,057,788.0	829,680.0	688,215.0	6,642,669.0	6,095,789.0	5,127,776.0	4,601,837.0
Total	21,664,316.0	19,759,025.0	16,692,521.0	13,912,660.0	3,116,303.0	2,930,697.0	2,507,038.0	2,059,435.0	1,957,220.0	1,821,075.0	1,576,369.0	1,220,891.0	4,072,978.0	3,668,536.0	3,155,660.0	2,560,147.0	12,517,815.0	11,338,717.0	9,453,454.0	8,072,187.0

Table 3.34—*Net annual growth of sawtimber on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976*

[Thousand board feet, International 1/4-inch log rule]

Section, region and species group	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952
New England:																				
Softwoods	1,775,066.0	1,610,911.0	1,150,000.0	991,000.0	27,872.0	28,399.0	28,077.0	24,981.0	71,653.0	29,764.0	23,414.0	21,801.0	582,687.0	661,842.0	368,229.0	307,790.0	1,092,854.0	890,906.0	730,280.0	636,428.0
Hardwoods	998,135.0	679,653.0	542,000.0	461,000.0	51,621.0	33,307.0	30,633.0	26,532.0	72,574.0	19,311.0	20,096.0	15,975.0	232,189.0	246,327.0	123,025.0	112,462.0	641,751.0	380,708.0	368,246.0	306,031.0
Total	2,773,201.0	2,290,564.0	1,692,000.0	1,452,000.0	79,493.0	61,706.0	58,710.0	51,513.0	144,227.0	49,075.0	43,510.0	37,776.0	814,876.0	908,169.0	491,254.0	420,252.0	1,734,605.0	1,271,614.0	1,098,526.0	942,459.0
Middle Atlantic:																				
Softwoods	622,799.0	483,134.0	447,000.0	421,000.0	26,157.0	18,291.0	16,700.0	14,900.0	48,928.0	44,152.0	40,100.0	38,100.0	62,961.0	30,390.0	28,113.0	26,212.0	484,753.0	390,301.0	362,087.0	341,788.0
Hardwoods	2,966,112.0	3,309,294.0	2,733,000.0	2,179,000.0	206,359.0	175,812.0	141,700.0	109,400.0	329,239.0	324,833.0	268,200.0	208,300.0	180,223.0	176,098.0	148,730.0	123,111.0	2,250,291.0	2,632,551.0	2,174,370.0	1,738,189.0
Total	3,588,911.0	3,792,428.0	3,180,000.0	2,600,000.0	232,516.0	194,103.0	158,400.0	124,300.0	378,167.0	368,985.0	308,300.0	246,400.0	243,184.0	206,488.0	176,843.0	149,323.0	2,735,044.0	3,022,852.0	2,536,457.0	2,079,977.0
Lake States:																				
Softwoods	1,472,755.0	1,246,430.0	1,188,068.0	799,966.0	258,039.0	189,540.0	163,256.0	103,780.0	419,717.0	361,038.0	392,121.0	256,718.0	197,135.0	221,597.0	153,391.0	119,400.0	597,864.0	474,255.0	479,300.0	320,068.0
Hardwoods	3,147,263.0	2,719,342.0	2,671,632.0	1,714,223.0	276,646.0	211,529.0	228,145.0	132,577.0	680,446.0	562,448.0	586,555.0	347,831.0	310,998.0	326,314.0	288,014.0	197,986.0	1,879,173.0	1,619,051.0	1,568,918.0	1,035,829.0
Total	4,620,018.0	3,965,772.0	3,859,700.0	2,514,189.0	534,685.0	401,069.0	391,401.0	236,357.0	1,100,163.0	923,486.0	978,676.0	604,549.0	508,133.0	547,911.0	441,405.0	317,386.0	2,477,037.0	2,093,306.0	2,048,218.0	1,355,897.0
Central States:																				
Softwoods	206,463.0	157,370.0	135,264.0	124,700.0	53,656.0	42,838.0	38,754.0	34,496.0	4,988.0	7,742.0	4,368.0	2,890.0	3,332.0	4,677.0	3,711.0	2,567.0	144,487.0	102,113.0	88,431.0	84,747.0
Hardwoods	2,698,077.0	2,708,171.0	2,407,880.0	2,470,800.0	154,153.0	110,099.0	107,120.0	106,576.0	107,575.0	121,509.0	98,115.0	81,040.0	55,725.0	70,210.0	62,870.0	50,720.0	2,380,624.0	2,406,353.0	2,139,775.0	2,232,464.0
Total	2,904,540.0	2,865,541.0	2,543,144.0	2,595,500.0	207,809.0	152,937.0	145,874.0	141,072.0	112,563.0	129,251.0	102,483.0	83,930.0	59,057.0	74,887.0	66,581.0	53,287.0	2,525,111.0	2,508,466.0	2,228,206.0	2,317,211.0
Total, North:																				
Softwoods	4,077,083.0	3,497,845.0	2,920,332.0	2,336,666.0	365,724.0	279,068.0	246,787.0	178,157.0	545,286.0	442,696.0	460,003.0	319,509.0	846,115.0	918,506.0	553,444.0	455,969.0	2,319,958.0	1,857,575.0	1,660,098.0	1,383,031.0
Hardwoods	9,809,587.0	9,416,460.0	8,354,512.0	6,825,023.0	688,779.0	530,747.0	507,598.0	375,085.0	1,189,834.0	1,028,101.0	972,966.0	653,146.0	779,135.0	818,949.0	622,639.0	484,279.0	7,151,839.0	7,038,663.0	6,251,309.0	5,312,513.0
Total	13,886,670.0	12,914,305.0	11,274,844.0	9,161,689.0	1,054,503.0	809,815.0	754,385.0	553,242.0	1,735,120.0	1,470,797.0	1,432,969.0	972,655.0	1,625,250.0	1,737,455.0	1,176,083.0	940,248.0	9,471,797.0	8,896,238.0	7,911,407.0	6,695,544.0
South Atlantic:																				
Softwoods	4,619,727.0	3,842,552.0	3,363,000.0	3,151,000.0	261,910.0	226,089.0	171,100.0	177,100.0	218,256.0	178,634.0	149,100.0	119,500.0	687,902.0	601,930.0	465,600.0	510,000.0	3,451,659.0	2,835,899.0	2,577,200.0	2,344,400.0
Hardwoods	4,806,733.0	3,663,129.0	2,741,945.0	2,410,607.0	351,973.0	259,326.0	191,561.0	155,756.0	136,908.0	103,407.0	50,889.0	42,609.0	423,576.0	341,676.0	287,562.0	307,600.0	3,894,276.0	2,958,720.0	2,211,933.0	1,904,642.0
Total	9,426,460.0	7,505,681.0	6,104,945.0	5,561,607.0	613,883.0	485,415.0	362,661.0	332,856.0	355,164.0	282,041.0	199,989.0	162,109.0	1,111,478.0	943,606.0	753,162.0	817,600.0	7,345,935.0	5,794,619.0	4,789,133.0	4,249,042.0
East Gulf:																				
Softwoods	5,875,017.0	5,150,205.0	4,302,530.0	3,385,000.0	264,731.0	242,693.0	182,163.0	137,300.0	328,953.0	292,455.0	171,887.0	130,100.0	1,245,145.0	1,111,782.0	992,562.0	793,200.0	4,036,188.0	3,503,275.0	2,955,918.0	2,324,400.0
Hardwoods	1,659,011.0	1,577,218.0	1,303,298.0	1,104,000.0	92,130.0	87,389.0	31,361.0	24,000.0	46,448.0	44,205.0	30,897.0	23,600.0	302,031.0	287,979.0	178,314.0	159,200.0	1,218,402.0	1,157,645.0	1,062,726.0	897,200.0
Total	7,534,028.0	6,727,423.0	5,605,828.0	4,489,000.0	356,861.0	330,082.0	213,524.0	161,300.0	375,401.0	336,660.0	202,784.0	153,700.0	1,547,176.0	1,399,761.0	1,170,876.0	952,400.0	5,254,590.0	4,660,920.0	4,018,644.0	3,221,600.0
Central Gulf:																				
Softwoods	6,606,398.0	5,767,722.0	4,890,000.0	3,068,000.0	505,080.0	596,040.0	636,200.0	385,800.0	232,631.0	203,180.0	134,400.0	144,200.0	1,427,630.0	1,424,160.0	1,339,800.0	1,064,300.0	4,441,057.0	3,544,342.0	2,779,600.0	1,473,700.0
Hardwoods	3,940,999.0	2,951,862.0	2,555,000.0	2,230,000.0	168,638.0	129,335.0	121,700.0	65,900.0	179,431.0	145,739.0	96,600.0	80,100.0	585,340.0	403,346.0	272,000.0	189,600.0	3,007,590.0	2,273,442.0	2,064,700.0	1,894,400.0
Total	10,547,397.0	8,719,584.0	7,445,000.0	5,298,000.0	673,718.0	725,375.0	757,900.0	451,700.0	412,062.0	348,919.0	231,000.0	224,300.0	2,012,970.0	1,827,506.0	1,611,800.0	1,253,900.0	7,448,647.0	5,817,784.0	4,844,300.0	3,368,100.0
West Gulf:																				
Softwoods	7,066,008.0	6,374,949.0	5,425,000.0	4,034,000.0	680,262.0	931,592.0	844,400.0	551,400.0	114,769.0	81,314.0	67,000.0	48,300.0	2,671,708.0	2,698,916.0	2,776,800.0	2,265,000.0	3,599,269.0	2,663,127.0	1,736,800.0	1,169,300.0
Hardwoods	2,889,246.0	2,592,791.0	1,774,000.0	2,009,000.0	122,717.0	123,340.0	130,100.0	79,500.0	135,957.0	97,280.0	94,100.0	60,100.0	702,752.0	626,212.0	412,700.0	334,300.0	1,927,820.0	1,745,959.0	1,137,100.0	1,535,100.0
Total	9,955,254.0	8,967,740.0	7,199,000.0	6,043,000.0	802,979.0	1,054,932.0	974,500.0	630,900.0	250,726.0	178,594.0	161,100.0	108,400.0	3,374,460.0	3,325,128.0	3,189,500.0	2,599,300.0	5,527,089.0	4,409,086.0	2,873,900.0	2,704,400.0
Total, South:																				
Softwoods	24,167,150.0	21,135,428.0	17,980,530.0	13,638,000.0	1,711,983.0	1,996,414.0	1,833,863.0	1,251,600.0	894,609.0	755,583.0	522,387.0	442,100.0	6,032,385.0	5,836,788.0	5,574,762.0	4,632,500.0	15,528,173.0	12,546,643.0	10,049,518.0	7,311,800.0
Hardwoods	13,295,989.0	10,785,000.0	8,374,243.0	7,753,607.0	735,458.0	599,390.0	474,722.0	325,156.0	498,744.0	390,631.0	272,486.0	206,409.0	2,013,699.0	1,659,213.0	1,150,576.0	990,700.0	10,048,088.0	8,135,766.0	6,476,459.0	6,231,342.0
Total	37,463,139.0	31,920,428.0	26,354,773.0	21,391,607.0	2,447,441.0	2,595,804.0	2,308,585.0	1,576,756.0	1,393,353.0	1,146,214.0	794,873.0	648,509.0	8,046,084.0	7,496,001.0	6,725,338.0	5,623,200.0	25,576,261.0	20,682,409.0	16,525,977.0	13,543,142.0
Pacific Northwest: Douglas-fir subregion (Western Oregon and western Washington):																				
Softwoods	8,301,000.0	7,457,900.0	6,458,000.0	5,718,000.0	1,320,400.0	1,466,900.0	1,126,000.0	1,065,000.0	1,960,700.0	1,910,000.0	1,738,000.0	1,522,000.0	3,277,300.0	2,287,000.0	2,043,000.0	1,840,000.0	1,742,600.0	1,794,000.0	1,551,000.0	1,291,000.0
Hardwoods	1,302,500.0	1,329,900.0	1,070,000.0	758,000.0	61,700.0	61,900.0	89,000.0	68,000.0	276,600.0	285,000.0	193,000.0	126,000.0	482,000.0	407,000.0	311,000.0	210,000.0	482,200.0	576,000.0	477,000.0	354,000.0
Total	9,603,500.0	8,787,800.0	7,528,000.0	6,476,000.0	1,382,100.0	1,528,800.0	1,215,000.0	1,133,000.0	2,237,300.0	2,195,000.0	1,931,000.0	1,648,000.0	3,759,300.0	2,694,000.0	2,354,000.0	2,050,000.0	2,224,800.0	2,370,000.0	2,028,000.0	1,645,000.0

Table 3.34—*Net annual growth of sawtimber on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976—Cont'd.*

[Thousand board feet, International 1/4-inch log rule]

Section, region and	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
species group	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952
Pine subregion (Eastern Oregon and eastern Washington):																				
Softwoods	2,566,500.0	2,808,100.0	2,579,300.0	1,995,000.0	1,227,800.0	1,400,100.0	1,283,700.0	1,079,700.0	469,500.0	446,000.0	408,700.0	262,700.0	355,700.0	360,000.0	318,400.0	234,000.0	513,500.0	602,000.0	568,500.0	418,600.0
Hardwoods	9,800.0	9,600.0	9,600.0	8,000.0	2,500.0	2,900.0	3,000.0	2,600.0	4,500.0	3,900.0	3,800.0	3,100.0	1,300.0	1,000.0	1,000.0	800.0	1,500.0	1,800.0	1,800.0	1,500.0
Total	2,576,300.0	2,817,700.0	2,588,900.0	2,003,000.0	1,230,300.0	1,403,000.0	1,286,700.0	1,082,300.0	474,000.0	449,900.0	412,500.0	265,800.0	357,000.0	361,000.0	319,400.0	234,800.0	515,000.0	603,800.0	570,300.0	420,100.0
Coastal Alaska:																				
Softwoods	111,000.0	90,000.0	66,000.0	32,000.0	102,936.0	83,718.0	61,480.0	29,885.0	6,718.0	5,910.0	4,248.0	1,985.0	3.0	2.0	2.0	.0	1,343.0	370.0	270.0	130.0
Hardwoods	86.0	88.0	89.0	89.0	53.0	55.0	56.0	56.0	33.0	33.0	33.0	33.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	111,086.0	90,088.0	66,089.0	32,089.0	102,989.0	83,773.0	61,536.0	29,941.0	6,751.0	5,943.0	4,281.0	2,018.0	3.0	2.0	2.0	.0	1,343.0	370.0	270.0	130.0
Interior Alaska:																				
Softwoods	246,280.0	246,280.0	246,280.0	246,280.0	.0	.0	.0	.0	234,110.0	234,110.0	234,110.0	234,110.0	.0	.0	.0	.0	12,170.0	12,170.0	12,170.0	12,170.0
Hardwoods	117,790.0	117,790.0	117,790.0	117,790.0	.0	.0	.0	.0	111,970.0	111,970.0	111,970.0	111,970.0	.0	.0	.0	.0	5,820.0	5,820.0	5,820.0	5,820.0
Total	364,070.0	364,070.0	364,070.0	364,070.0	.0	.0	.0	.0	346,080.0	346,080.0	346,080.0	346,080.0	.0	.0	.0	.0	17,990.0	17,990.0	17,990.0	17,990.0
Total, Pacific Northwest:																				
Softwoods	11,224,780.0	10,602,280.0	9,349,580.0	7,991,280.0	2,651,136.0	2,950,718.0	2,471,180.0	2,174,585.0	2,671,028.0	2,596,020.0	2,385,058.0	2,020,795.0	3,633,003.0	2,647,002.0	2,361,402.0	2,074,000.0	2,269,613.0	2,408,540.0	2,131,940.0	1,721,900.0
Hardwoods	1,430,176.0	1,457,378.0	1,197,479.0	883,879.0	64,253.0	64,855.0	92,056.0	70,656.0	393,103.0	400,903.0	308,803.0	241,103.0	483,300.0	408,000.0	312,000.0	210,800.0	489,520.0	583,620.0	484,620.0	361,320.0
Total	12,654,956.0	12,059,658.0	10,547,059.0	8,875,159.0	2,715,389.0	3,015,573.0	2,563,236.0	2,245,241.0	3,064,131.0	2,996,923.0	2,693,861.0	2,261,898.0	4,116,303.0	3,055,002.0	2,673,402.0	2,284,800.0	2,759,133.0	2,992,160.0	2,616,560.0	2,083,220.0
Pacific Southwest:																				
Softwoods	3,885,300.0	3,938,100.0	2,184,200.0	2,038,000.0	1,896,400.0	1,770,100.0	829,200.0	735,000.0	88,500.0	94,000.0	59,000.0	59,000.0	790,700.0	828,000.0	493,000.0	423,000.0	1,109,700.0	1,246,000.0	803,000.0	821,000.0
Hardwoods	137,933.0	168,033.0	161,000.0	156,000.0	25,100.0	33,200.0	49,000.0	50,000.0	14,102.0	13,302.0	10,000.0	12,000.0	24,300.0	40,000.0	30,000.0	24,000.0	74,431.0	81,531.0	72,000.0	70,000.0
Total	4,023,233.0	4,106,133.0	2,345,200.0	2,194,000.0	1,921,500.0	1,803,300.0	878,200.0	785,000.0	102,602.0	107,302.0	69,000.0	71,000.0	815,000.0	868,000.0	523,000.0	447,000.0	1,184,131.0	1,327,531.0	875,000.0	891,000.0
Total, Pacific Coast:																				
Softwoods	15,110,080.0	14,540,380.0	11,533,780.0	10,029,280.0	4,547,536.0	4,720,818.0	3,300,380.0	2,909,585.0	2,759,528.0	2,690,020.0	2,444,058.0	2,079,795.0	4,423,703.0	3,475,002.0	2,854,402.0	2,497,000.0	3,379,313.0	3,654,540.0	2,934,940.0	2,542,900.0
Hardwoods	1,568,109.0	1,625,411.0	1,358,479.0	1,039,879.0	89,353.0	98,055.0	141,056.0	120,656.0	407,205.0	414,205.0	318,803.0	253,103.0	507,600.0	448,000.0	342,000.0	234,800.0	563,951.0	665,151.0	556,620.0	431,320.0
Total	16,678,189.0	16,165,791.0	12,892,259.0	11,069,159.0	4,636,889.0	4,818,873.0	3,441,436.0	3,030,241.0	3,166,733.0	3,104,225.0	2,762,861.0	2,332,898.0	4,931,303.0	3,923,002.0	3,196,402.0	2,731,800.0	3,943,264.0	4,319,691.0	3,491,560.0	2,974,220.0
Northern Rocky Mtn.:																				
Softwoods	4,845,272.0	3,968,401.0	3,578,000.0	3,297,000.0	3,142,032.0	2,278,401.0	2,005,000.0	1,866,000.0	468,232.0	465,698.0	433,770.0	392,864.0	442,784.0	441,041.0	409,906.0	373,272.0	792,224.0	783,261.0	729,324.0	664,864.0
Hardwoods	37,061.0	27,841.0	27,000.0	26,000.0	11,412.0	2,841.0	3,000.0	3,000.0	8,225.0	8,148.0	7,595.0	7,050.0	2,909.0	2,859.0	2,674.0	2,489.0	14,515.0	13,993.0	13,731.0	13,461.0
Total	4,882,333.0	3,996,242.0	3,605,000.0	3,323,000.0	3,153,444.0	2,281,242.0	2,008,000.0	1,869,000.0	476,457.0	473,846.0	441,365.0	399,914.0	445,693.0	443,900.0	412,580.0	375,761.0	806,739.0	797,254.0	743,055.0	678,325.0
Southern Rocky Mtn.:																				
Softwoods	1,492,085.0	1,129,581.0	963,000.0	869,000.0	1,263,085.0	900,581.0	768,000.0	710,000.0	89,649.0	89,649.0	75,054.0	58,490.0	1,566.0	3,900.0	3,318.0	2,887.0	137,785.0	135,451.0	116,628.0	97,623.0
Hardwoods	218,416.0	114,764.0	80,000.0	72,000.0	187,416.0	83,764.0	52,000.0	46,000.0	3,404.0	3,404.0	2,983.0	2,944.0	6.0	531.0	482.0	434.0	27,590.0	27,065.0	24,535.0	22,622.0
Total	1,710,501.0	1,244,345.0	1,043,000.0	941,000.0	1,450,501.0	984,345.0	820,000.0	756,000.0	93,053.0	93,053.0	78,037.0	61,434.0	1,572.0	4,431.0	3,800.0	3,321.0	165,375.0	162,516.0	141,163.0	120,245.0
Total, Rocky Mtn.:																				
Softwoods	6,337,357.0	5,097,982.0	4,541,000.0	4,166,000.0	4,405,117.0	3,178,982.0	2,773,000.0	2,576,000.0	557,881.0	555,347.0	508,824.0	451,354.0	444,350.0	444,941.0	413,224.0	376,159.0	930,009.0	918,712.0	845,952.0	762,487.0
Hardwoods	255,477.0	142,605.0	107,000.0	98,000.0	198,828.0	86,605.0	55,000.0	49,000.0	11,629.0	11,552.0	10,578.0	9,994.0	2,915.0	3,390.0	3,156.0	2,923.0	42,105.0	41,058.0	38,266.0	36,083.0
Total	6,592,834.0	5,240,587.0	4,648,000.0	4,264,000.0	4,603,945.0	3,265,587.0	2,828,000.0	2,625,000.0	569,510.0	566,899.0	519,402.0	461,348.0	447,265.0	448,331.0	416,380.0	379,082.0	972,114.0	959,770.0	884,218.0	798,570.0
Total, all regions:																				
Softwoods	49,691,670.0	44,271,635.0	36,975,642.0	30,169,946.0	11,030,360.0	10,175,282.0	8,154,030.0	6,915,342.0	4,757,304.0	4,443,646.0	3,935,272.0	3,292,758.0	11,746,553.0	10,675,237.0	9,395,832.0	7,961,628.0	22,157,453.0	18,977,470.0	15,490,508.0	12,000,218.0
Hardwoods	24,929,162.0	21,969,476.0	18,194,234.0	15,716,509.0	1,712,418.0	1,314,797.0	1,178,376.0	869,897.0	2,107,412.0	1,844,489.0	1,574,833.0	1,122,652.0	3,303,349.0	2,929,552.0	2,118,371.0	1,712,702.0	17,805,983.0	15,880,638.0	13,322,654.0	12,011,258.0
Total	74,620,832.0	66,241,111.0	55,169,876.0	45,886,455.0	12,742,778.0	11,490,079.0	9,332,406.0	7,785,239.0	6,864,716.0	6,288,135.0	5,510,105.0	4,415,410.0	15,049,902.0	13,604,789.0	11,514,203.0	9,674,330.0	39,963,436.0	34,858,108.0	28,813,162.0	24,011,476.0

Table 3.35—*Net annual growth of growing stock on commercial timberland in the eastern United States, by species, section, and region, 1976*

[Thousand cubic feet]

Section and region	All species	Softwoods: Total softwoods	Softwoods: Southern yellow pines	Softwoods: Eastern white and red pines	Softwoods: Spruce and balsam fir	Softwoods: Other eastern softwoods	Hardwoods: Total hardwoods	Hardwoods: Select white and red oaks	Hardwoods: Other white and red oaks	Hardwoods: Hickory	Hardwoods: Yellow birch	Hardwoods: Hard maple	Hardwoods: Sweetgum	Hardwoods: Ash, black walnut and black cherry	Hardwoods: Yellow-poplar	Hardwoods: Other eastern hardwoods
New England	1,344,631.0	838,200.0	2,235.0	218,221.0	482,800.0	134,944.0	506,431.0	94,481.0	34,504.0	5,315.0	21,559.0	73,229.0	.0	26,341.0	1,005.0	249,997.0
Middle Atlantic	1,795,211.0	229,071.0	71,874.0	73,708.0	25,049.0	58,440.0	1,566,140.0	324,598.0	252,172.0	53,320.0	12,438.0	144,053.0	13,269.0	186,231.0	116,516.0	463,543.0
Lake States	1,617,407.0	463,444.0	1,070.0	100,108.0	175,166.0	187,100.0	1,153,963.0	128,036.0	33,757.0	8,416.0	17,484.0	181,215.0	.0	65,857.0	462.0	718,736.0
Central States	1,034,503.0	69,069.0	52,876.0	1,132.0	.0	15,061.0	965,434.0	219,855.0	221,571.0	95,785.0	.0	41,080.0	12,851.0	90,053.0	77,516.0	206,723.0
Total, North	5,791,752.0	1,599,784.0	128,055.0	393,169.0	683,015.0	395,545.0	4,191,968.0	766,970.0	542,004.0	162,836.0	51,481.0	439,577.0	26,120.0	368,482.0	195,499.0	1,638,999.0
South Atlantic	2,747,805.0	1,264,642.0	1,173,619.0	44,595.0	683.0	45,745.0	1,483,163.0	251,426.0	362,463.0	70,344.0	1,881.0	9,905.0	150,931.0	38,874.0	296,588.0	300,751.0
East Gulf	2,325,871.0	1,722,352.0	1,646,755.0	10,562.0	.0	65,035.0	603,519.0	51,363.0	192,168.0	26,056.0	.0	555.0	98,589.0	19,480.0	67,938.0	147,370.0
Central Gulf	2,910,019.0	1,555,099.0	1,516,444.0	6,507.0	.0	32,148.0	1,354,920.0	215,489.0	438,876.0	124,730.0	.0	12,013.0	164,434.0	49,505.0	81,333.0	268,540.0
West Gulf	2,720,965.0	1,615,964.0	1,560,056.0	.0	.0	55,908.0	1,105,001.0	151,884.0	416,213.0	103,923.0	.0	2,399.0	159,650.0	47,872.0	1,362.0	221,698.0
Total, South	10,704,660.0	6,158,057.0	5,896,874.0	61,664.0	683.0	198,836.0	4,546,603.0	670,162.0	1,409,720.0	325,053.0	1,881.0	24,872.0	573,604.0	155,731.0	447,221.0	938,359.0
Total, eastern regions	16,496,412.0	7,757,841.0	6,024,929.0	454,833.0	683,698.0	594,381.0	8,738,571.0	1,437,132.0	1,951,724.0	487,889.0	53,362.0	464,449.0	599,724.0	524,213.0	642,720.0	2,577,358.0

Table 3.36—*Net annual growth of sawtimber on commercial timberland in the eastern United States, by species, section, and region, 1976*

[Thousand board feet, International 1/4-inch log rule]

Section and region	All species	Softwoods					Hardwoods									
		Total softwoods	Southern yellow pines	Eastern white and red pines	Spruce and balsam fir	Other eastern softwoods	Total hardwoods	Select white and red oaks	Other white and red oaks	Hickory	Yellow birch	Hard maple	Sweetgum	Ash, black walnut and black cherry	Yellow-poplar	Other eastern hardwoods
New England	2,773,201.0	1,775,066.0	7,277.0	704,539.0	743,019.0	320,231.0	998,135.0	241,735.0	92,045.0	11,280.0	47,173.0	162,005.0	.0	61,168.0	3,476.0	379,253.0
Middle Atlantic	3,588,911.0	622,799.0	197,572.0	160,821.0	105,503.0	158,903.0	2,966,112.0	692,060.0	387,453.0	57,865.0	18,243.0	280,230.0	32,786.0	350,841.0	235,450.0	911,184.0
Lake States	4,620,018.0	1,472,755.0	3,827.0	465,901.0	443,686.0	559,341.0	3,147,263.0	474,561.0	112,368.0	24,417.0	64,750.0	425,305.0	.0	133,128.0	1,010.0	1,911,724.0
Central States	2,904,540.0	206,463.0	171,542.0	2,118.0	.0	32,803.0	2,698,077.0	685,935.0	668,359.0	209,936.0	.0	108,147.0	32,089.0	199,891.0	212,536.0	581,184.0
Total, North	13,886,670.0	4,077,083.0	380,218.0	1,333,379.0	1,292,208.0	1,071,278.0	9,809,587.0	2,094,291.0	1,260,225.0	303,498.0	130,166.0	975,687.0	64,875.0	745,028.0	452,472.0	3,783,345.0
South Atlantic	9,426,460.0	4,619,727.0	4,237,316.0	196,303.0	3,511.0	182,597.0	4,806,733.0	869,088.0	1,171,709.0	226,574.0	1,612.0	26,151.0	437,012.0	105,827.0	1,142,714.0	826,046.0
East Gulf	7,534,028.0	5,875,017.0	5,587,433.0	46,437.0	.0	241,147.0	1,659,011.0	150,799.0	528,815.0	76,559.0	.0	1,873.0	227,225.0	53,957.0	228,761.0	391,022.0
Central Gulf	10,547,397.0	6,606,398.0	6,485,951.0	29,454.0	.0	90,993.0	3,940,999.0	714,876.0	1,341,476.0	370,384.0	.0	30,372.0	366,560.0	143,743.0	309,748.0	663,840.0
West Gulf	9,955,254.0	7,066,008.0	6,862,795.0	.0	.0	203,213.0	2,889,246.0	418,587.0	1,139,891.0	219,403.0	.0	3,047.0	407,002.0	90,085.0	3,751.0	607,480.0
Total, South	37,463,139.0	24,167,150.0	23,173,495.0	272,194.0	3,511.0	717,950.0	13,295,989.0	2,153,350.0	4,181,891.0	892,920.0	1,612.0	61,443.0	1,437,799.0	393,612.0	1,684,974.0	2,488,388.0
Total, eastern regions	51,349,809.0	28,244,233.0	23,553,713.0	1,605,573.0	1,295,719.0	1,789,228.0	23,105,576.0	4,247,641.0	5,442,116.0	1,196,418.0	131,778.0	1,037,130.0	1,502,674.0	1,138,640.0	2,137,446.0	6,271,733.0

Table 3.37—*Net annual growth of growing stock on commercial timberland in the western United States, by species, section, and region, 1976*

[Thousand cubic feet]

Section and region	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	Western white and sugar pines	Western hemlock	True firs	Redwood	Other western softwoods	Western hardwoods
Pacific Northwest:										
Douglas-fir subregion (Western Oregon and western Washington)	1,941,600.0	1,544,600.0	880,600.0	5,100.0	-15,600.0	488,000.0	88,900.0	600.0	97,000.0	397,000.0
Pine subregion (Eastern Oregon and eastern Washington)	617,900.0	614,100.0	161,900.0	174,000.0	1,000.0	9,500.0	132,800.0	.0	134,900.0	3,800.0
Coastal Alaska	24,424.0	24,400.0	.0	.0	.0	16,267.0	96.0	.0	8,037.0	24.0
Interior Alaska	102,090.0	41,400.0	.0	.0	.0	.0	.0	.0	41,400.0	60,690.0
Total, Pacific Northwest	2,686,014.0	2,224,500.0	1,042,500.0	179,100.0	-14,600.0	513,767.0	221,796.0	600.0	281,337.0	461,514.0
Pacific Southwest	792,337.0	713,200.0	158,500.0	156,300.0	44,300.0	1,700.0	202,500.0	92,100.0	57,800.0	79,137.0
Total, Pacific Coast	3,478,351.0	2,937,700.0	1,201,000.0	335,400.0	29,700.0	515,467.0	424,296.0	92,700.0	339,137.0	540,651.0
Northern Rocky Mtn	1,280,269.0	1,264,379.0	298,175.0	161,715.0	29,104.0	41,893.0	226,983.0	.0	506,509.0	15,890.0
Southern Rocky Mtn	409,284.0	324,821.0	28,802.0	114,007.0	-13.0	33.0	44,314.0	.0	137,678.0	84,463.0
Total, Rocky Mtn	1,689,553.0	1,589,200.0	326,977.0	275,722.0	29,091.0	41,926.0	271,297.0	.0	644,187.0	100,353.0
Total, western regions	5,167,904.0	4,526,900.0	1,527,977.0	611,122.0	58,791.0	557,393.0	695,593.0	92,700.0	983,324.0	641,004.0

Table 3.38—*Net annual growth of sawtimber on commercial timberland in the western United States, by species, section, and region, 1976*

[Thousand board feet, International 1/4-inch log rule]

Section and region	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	Western white and sugar pines	Western hemlock	True firs	Redwood	Other western softwoods	Western hardwoods
Pacific Northwest:										
Douglas-fir subregion (Western Oregon and western Washington)	9,603,500.0	8,301,000.0	4,865,600.0	34,500.0	-90,400.0	2,562,100.0	464,100.0	3,700.0	461,400.0	1,302,500.0
Pine subregion (Eastern Oregon and eastern Washington)	2,576,300.0	2,566,500.0	696,200.0	828,400.0	1,900.0	40,200.0	522,100.0	.0	477,700.0	9,800.0
Coastal Alaska	111,086.0	111,000.0	.0	.0	.0	72,909.0	437.0	.0	37,654.0	86.0
Interior Alaska	364,070.0	246,280.0	.0	.0	.0	.0	.0	.0	246,280.0	117,790.0
Total, Pacific Northwest	12,654,956.0	11,224,780.0	5,561,800.0	862,900.0	-88,500.0	2,675,209.0	986,637.0	3,700.0	1,223,034.0	1,430,176.0
Pacific Southwest	4,023,233.0	3,885,300.0	843,900.0	876,000.0	260,100.0	8,400.0	1,163,700.0	479,300.0	253,900.0	137,933.0
Total, Pacific Coast	16,678,189.0	15,110,080.0	6,405,700.0	1,738,900.0	171,600.0	2,683,609.0	2,150,337.0	483,000.0	1,476,934.0	1,568,109.0
Northern Rocky Mtn	4,882,333.0	4,845,272.0	1,300,845.0	717,347.0	138,272.0	205,627.0	888,398.0	.0	1,594,783.0	37,061.0
Southern Rocky Mtn	1,710,501.0	1,492,085.0	125,700.0	466,788.0	552.0	150.0	210,614.0	.0	688,281.0	218,416.0
Total, Rocky Mtn	6,592,834.0	6,337,357.0	1,426,545.0	1,184,135.0	138,824.0	205,777.0	1,099,012.0	.0	2,283,064.0	255,477.0
Total, western regions	23,271,023.0	21,447,437.0	7,832,245.0	2,923,035.0	310,424.0	2,889,386.0	3,249,349.0	483,000.0	3,759,998.0	1,823,586.0

Table 3.39—*Annual removals of growing stock on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976*

[Thousand cubic feet]

Section, region and species group	All ownerships 1976	All ownerships 1970	All ownerships 1962	All ownerships 1952	National Forest 1976	National Forest 1970	National Forest 1962	National Forest 1952	Other public 1976	Other public 1970	Other public 1962	Other public 1952	Forest industry 1976	Forest industry 1970	Forest industry 1962	Forest industry 1952	Farmer and other private 1976	Farmer and other private 1970	Farmer and other private 1962	Farmer and other private 1952
New England:																				
Softwoods	395,638.0	336,235.0	274,000.0	339,000.0	1,941.0	1,487.0	1,300.0	1,800.0	11,231.0	6,823.0	3,600.0	4,100.0	162,062.0	127,534.0	80,223.0	88,134.0	220,404.0	200,391.0	188,877.0	244,966.0
Hardwoods	243,561.0	225,147.0	153,700.0	148,500.0	10,050.0	5,522.0	3,100.0	3,400.0	10,075.0	5,718.0	4,700.0	4,400.0	87,663.0	73,478.0	36,362.0	35,092.0	135,773.0	140,429.0	109,538.0	105,608.0
Total	639,199.0	561,382.0	427,700.0	487,500.0	11,991.0	7,009.0	4,400.0	5,200.0	21,306.0	12,541.0	8,300.0	8,500.0	249,725.0	201,012.0	116,585.0	123,226.0	356,177.0	340,820.0	298,415.0	350,574.0
Middle Atlantic:																				
Softwoods	102,938.0	76,711.0	101,400.0	134,000.0	601.0	1,445.0	1,750.0	950.0	3,114.0	2,517.0	2,600.0	3,100.0	19,688.0	9,975.0	11,818.0	16,532.0	79,535.0	62,774.0	85,232.0	113,418.0
Hardwoods	560,133.0	512,601.0	441,200.0	355,700.0	19,266.0	13,160.0	7,700.0	6,100.0	20,212.0	31,198.0	25,600.0	19,300.0	33,226.0	17,493.0	14,779.0	11,699.0	487,429.0	450,750.0	393,121.0	318,601.0
Total	663,071.0	589,312.0	542,600.0	489,700.0	19,867.0	14,605.0	9,450.0	7,050.0	23,326.0	33,715.0	28,200.0	22,400.0	52,914.0	27,468.0	26,597.0	28,231.0	566,964.0	513,524.0	478,353.0	432,019.0
Lake States:																				
Softwoods	181,307.0	159,451.0	141,904.0	142,199.0	30,233.0	26,453.0	28,649.0	18,723.0	48,021.0	43,205.0	38,817.0	35,370.0	33,039.0	27,663.0	22,902.0	34,186.0	70,014.0	62,130.0	51,536.0	53,920.0
Hardwoods	538,100.0	495,626.0	349,692.0	378,359.0	39,948.0	38,883.0	27,179.0	21,528.0	83,913.0	75,394.0	54,879.0	41,682.0	62,826.0	57,198.0	39,084.0	67,394.0	351,413.0	324,151.0	228,550.0	247,755.0
Total	719,407.0	655,077.0	491,596.0	520,558.0	70,181.0	65,336.0	55,828.0	40,251.0	131,934.0	118,599.0	93,696.0	77,052.0	95,865.0	84,861.0	61,986.0	101,580.0	421,427.0	386,281.0	280,086.0	301,675.0
Central States:																				
Softwoods	25,474.0	24,005.0	22,821.0	20,230.0	7,905.0	3,373.0	1,804.0	3,615.0	147.0	434.0	443.0	541.0	154.0	378.0	395.0	209.0	17,268.0	19,820.0	20,179.0	15,865.0
Hardwoods	611,684.0	642,242.0	593,357.0	596,500.0	14,307.0	9,768.0	12,711.0	12,856.0	7,415.0	8,047.0	6,687.0	7,890.0	6,954.0	9,098.0	7,872.0	9,604.0	583,008.0	615,329.0	566,087.0	566,150.0
Total	637,158.0	666,247.0	616,178.0	616,730.0	22,212.0	13,141.0	14,515.0	16,471.0	7,562.0	8,481.0	7,130.0	8,431.0	7,108.0	9,476.0	8,267.0	9,813.0	600,276.0	635,149.0	586,266.0	582,015.0
Total, North:																				
Softwoods	705,357.0	596,402.0	540,125.0	635,429.0	40,680.0	32,758.0	33,503.0	25,088.0	62,513.0	52,979.0	45,460.0	43,111.0	214,943.0	165,550.0	115,338.0	139,061.0	387,221.0	345,115.0	345,824.0	428,169.0
Hardwoods	1,953,478.0	1,875,616.0	1,537,949.0	1,479,059.0	83,571.0	67,333.0	50,690.0	43,884.0	121,615.0	120,357.0	91,866.0	73,272.0	190,669.0	157,267.0	98,097.0	123,789.0	1,557,623.0	1,530,659.0	1,297,296.0	1,238,114.0
Total	2,658,835.0	2,472,018.0	2,078,074.0	2,114,488.0	124,251.0	100,091.0	84,193.0	68,972.0	184,128.0	173,336.0	137,326.0	116,383.0	405,612.0	322,817.0	213,435.0	262,850.0	1,944,844.0	1,875,774.0	1,643,120.0	1,666,283.0
South Atlantic:																				
Softwoods	981,152.0	841,530.0	760,600.0	916,000.0	28,126.0	19,761.0	15,906.0	6,642.0	33,380.0	28,157.0	20,600.0	27,000.0	228,505.0	187,924.0	98,200.0	143,600.0	691,141.0	605,688.0	625,894.0	738,758.0
Hardwoods	683,054.0	741,070.0	676,900.0	650,000.0	16,719.0	20,783.0	14,204.0	10,229.0	21,106.0	15,779.0	7,700.0	8,400.0	94,957.0	107,315.0	90,000.0	103,500.0	550,272.0	597,193.0	564,996.0	527,871.0
Total	1,664,206.0	1,582,600.0	1,437,500.0	1,566,000.0	44,845.0	40,544.0	30,110.0	16,871.0	54,486.0	43,936.0	28,300.0	35,400.0	323,462.0	295,239.0	188,200.0	247,100.0	1,241,413.0	1,202,881.0	1,190,890.0	1,266,629.0
East Gulf:																				
Softwoods	1,047,652.0	957,835.0	807,900.0	919,400.0	38,657.0	15,480.0	12,272.0	7,882.0	46,218.0	42,493.0	24,100.0	25,500.0	289,355.0	270,523.0	163,700.0	180,900.0	673,422.0	629,339.0	607,828.0	705,118.0
Hardwoods	319,467.0	318,004.0	375,597.0	363,900.0	3,971.0	4,914.0	3,453.0	2,217.0	12,780.0	12,845.0	8,465.0	7,100.0	51,644.0	53,895.0	67,617.0	65,300.0	251,072.0	246,350.0	296,062.0	289,283.0
Total	1,367,119.0	1,275,839.0	1,183,497.0	1,283,300.0	42,628.0	20,394.0	15,725.0	10,099.0	58,998.0	55,338.0	32,565.0	32,600.0	340,999.0	324,418.0	231,317.0	246,200.0	924,494.0	875,689.0	903,890.0	994,401.0
Central Gulf:																				
Softwoods	1,138,513.0	993,270.0	564,300.0	706,700.0	47,879.0	79,417.0	37,500.0	68,412.0	34,394.0	25,284.0	16,300.0	34,780.0	286,060.0	189,249.0	92,400.0	213,662.0	770,180.0	699,320.0	418,100.0	389,846.0
Hardwoods	621,215.0	724,792.0	846,400.0	849,700.0	12,523.0	15,640.0	17,800.0	23,324.0	32,087.0	28,562.0	19,700.0	28,371.0	94,253.0	97,847.0	135,800.0	83,881.0	482,352.0	582,743.0	673,100.0	714,124.0
Total	1,759,728.0	1,718,062.0	1,410,700.0	1,556,400.0	60,402.0	95,057.0	55,300.0	91,736.0	66,481.0	53,846.0	36,000.0	63,151.0	380,313.0	287,096.0	228,200.0	297,543.0	1,252,532.0	1,282,063.0	1,091,200.0	1,103,970.0
West Gulf:																				
Softwoods	1,303,803.0	975,614.0	678,900.0	569,800.0	131,244.0	83,971.0	55,800.0	75,700.0	16,242.0	13,241.0	15,900.0	7,800.0	629,841.0	407,240.0	248,400.0	280,300.0	526,476.0	471,162.0	358,800.0	206,000.0
Hardwoods	476,380.0	948,994.0	814,200.0	699,500.0	7,592.0	32,166.0	29,500.0	31,100.0	17,283.0	17,322.0	17,200.0	17,700.0	116,911.0	183,171.0	237,300.0	123,600.0	334,594.0	716,335.0	530,200.0	527,100.0
Total	1,780,183.0	1,924,608.0	1,493,100.0	1,269,300.0	138,836.0	116,137.0	85,300.0	106,800.0	33,525.0	30,563.0	33,100.0	25,500.0	746,752.0	590,411.0	485,700.0	403,900.0	861,070.0	1,187,497.0	889,000.0	733,100.0
Total, South:																				
Softwoods	4,471,120.0	3,768,249.0	2,811,700.0	3,111,900.0	245,906.0	198,629.0	121,478.0	158,636.0	130,234.0	109,175.0	76,900.0	95,080.0	1,433,761.0	1,054,936.0	602,700.0	818,462.0	2,661,219.0	2,405,509.0	2,010,622.0	2,039,722.0
Hardwoods	2,100,116.0	2,732,860.0	2,713,097.0	2,563,100.0	40,805.0	73,503.0	64,957.0	66,870.0	83,256.0	74,508.0	53,065.0	61,571.0	357,765.0	442,228.0	530,717.0	376,281.0	1,618,290.0	2,142,621.0	2,064,358.0	2,058,378.0
Total	6,571,236.0	6,501,109.0	5,524,797.0	5,675,000.0	286,711.0	272,132.0	186,435.0	225,506.0	213,490.0	183,683.0	129,965.0	156,651.0	1,791,526.0	1,497,164.0	1,133,417.0	1,194,743.0	4,279,509.0	4,548,130.0	4,074,980.0	4,098,100.0
Pacific Northwest: Douglas-fir subregion (Western Oregon and western Washington):																				
Softwoods	2,466,649.0	2,420,000.0	1,951,000.0	1,971,000.0	525,243.0	530,000.0	567,000.0	364,000.0	438,984.0	359,000.0	274,000.0	155,000.0	1,302,332.0	1,272,000.0	909,000.0	1,150,000.0	200,090.0	259,000.0	201,000.0	302,000.0
Hardwoods	106,257.0	85,000.0	57,000.0	31,000.0	642.0	6,000.0	1,000.0	.0	15,246.0	13,000.0	3,000.0	5,000.0	43,562.0	44,000.0	24,000.0	18,000.0	46,807.0	22,000.0	29,000.0	8,000.0
Total	2,572,906.0	2,505,000.0	2,008,000.0	2,002,000.0	525,885.0	536,000.0	568,000.0	364,000.0	454,230.0	372,000.0	277,000.0	160,000.0	1,345,894.0	1,316,000.0	933,000.0	1,168,000.0	246,897.0	281,000.0	230,000.0	310,000.0

Table 3.39—*Annual removals of growing stock on commercial timberland in the United States, by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976—Cont'd.*

[Thousand cubic feet]

Section, region and species group	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952
Pine subregion (Eastern Oregon and eastern Washington):																				
Softwoods	635,058.0	586,000.0	483,000.0	379,000.0	312,567.0	314,000.0	256,000.0	121,000.0	95,820.0	103,000.0	64,000.0	52,000.0	161,780.0	120,000.0	95,000.0	103,000.0	64,891.0	49,000.0	68,000.0	103,000.0
Hardwoods	29.0	2,100.0	700.0	600.0	3.0	1,100.0	400.0	300.0	12.0	100.0	.0	.0	.0	.0	.0	.0	14.0	900.0	300.0	300.0
Total	635,087.0	588,100.0	483,700.0	379,600.0	312,570.0	315,100.0	256,400.0	121,300.0	95,832.0	103,100.0	64,000.0	52,000.0	161,780.0	120,000.0	95,000.0	103,000.0	64,905.0	49,900.0	68,300.0	103,300.0
Coastal Alaska:																				
Softwoods	105,886.0	203,020.0	97,446.0	17,375.0	99,108.0	184,908.0	93,840.0	16,739.0	5,295.0	14,051.0	3,606.0	636.0	.0	.0	.0	.0	1,483.0	4,061.0	.0	.0
Hardwoods	22.0	.0	.0	.0	22.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	105,908.0	203,020.0	97,446.0	17,375.0	99,130.0	184,908.0	93,840.0	16,739.0	5,295.0	14,051.0	3,606.0	636.0	.0	.0	.0	.0	1,483.0	4,061.0	.0	.0
Interior Alaska:																				
Softwoods	1,551.0	1,551.0	1,551.0	1,551.0	.0	.0	.0	.0	1,447.0	1,447.0	1,447.0	1,447.0	.0	.0	.0	.0	104.0	104.0	104.0	104.0
Hardwoods	3,142.0	3,142.0	3,142.0	3,142.0	.0	.0	.0	.0	3,142.0	3,142.0	3,142.0	3,142.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	4,693.0	4,693.0	4,693.0	4,693.0	.0	.0	.0	.0	4,589.0	4,589.0	4,589.0	4,589.0	.0	.0	.0	.0	104.0	104.0	104.0	104.0
Total, Pacific Northwest:																				
Softwoods	3,209,144.0	3,210,571.0	2,532,997.0	2,368,926.0	936,918.0	1,028,908.0	916,840.0	501,739.0	541,546.0	477,498.0	343,053.0	209,083.0	1,464,112.0	1,392,000.0	1,004,000.0	1,253,000.0	266,568.0	312,165.0	269,104.0	405,104.0
Hardwoods	109,450.0	90,242.0	60,842.0	34,742.0	667.0	7,100.0	1,400.0	300.0	18,400.0	16,242.0	6,142.0	8,142.0	43,562.0	44,000.0	24,000.0	18,000.0	46,821.0	22,900.0	29,300.0	8,300.0
Total	3,318,594.0	3,300,813.0	2,593,839.0	2,403,668.0	937,585.0	1,036,008.0	918,240.0	502,039.0	559,946.0	493,740.0	349,195.0	217,225.0	1,507,674.0	1,436,000.0	1,028,000.0	1,271,000.0	313,389.0	335,065.0	298,404.0	413,404.0
Pacific Southwest:																				
Softwoods	818,402.0	901,000.0	1,001,000.0	1,120,000.0	306,082.0	378,000.0	263,000.0	117,000.0	23,734.0	27,000.0	18,000.0	5,000.0	343,729.0	318,000.0	449,000.0	456,000.0	144,857.0	178,000.0	271,000.0	542,000.0
Hardwoods	16,805.0	26,758.0	20,500.0	12,500.0	817.0	9,000.0	7,000.0	4,000.0	2,750.0	2,364.0	2,197.0	1,197.0	3,693.0	5,000.0	4,000.0	3,000.0	9,545.0	10,394.0	7,303.0	4,303.0
Total	835,207.0	927,758.0	1,021,500.0	1,132,500.0	306,899.0	387,000.0	270,000.0	121,000.0	26,484.0	29,364.0	20,197.0	6,197.0	347,422.0	323,000.0	453,000.0	459,000.0	154,402.0	188,394.0	278,303.0	546,303.0
Total, Pacific Coast:																				
Softwoods	4,027,546.0	4,111,571.0	3,533,997.0	3,488,926.0	1,243,000.0	1,406,908.0	1,179,840.0	618,739.0	565,280.0	504,498.0	361,053.0	214,083.0	1,807,841.0	1,710,000.0	1,453,000.0	1,709,000.0	411,425.0	490,165.0	540,104.0	947,104.0
Hardwoods	126,255.0	117,000.0	81,342.0	47,242.0	1,484.0	16,100.0	8,400.0	4,300.0	21,150.0	18,606.0	8,339.0	9,339.0	47,255.0	49,000.0	28,000.0	21,000.0	56,366.0	33,294.0	36,603.0	12,603.0
Total	4,153,801.0	4,228,571.0	3,615,339.0	3,536,168.0	1,244,484.0	1,423,008.0	1,188,240.0	623,039.0	586,430.0	523,104.0	369,392.0	223,422.0	1,855,096.0	1,759,000.0	1,481,000.0	1,730,000.0	467,791.0	523,459.0	576,707.0	959,707.0
Northern Rocky Mtn.:																				
Softwoods	669,307.0	701,019.0	567,179.0	408,187.0	340,529.0	374,949.0	303,331.0	147,444.0	61,558.0	59,167.0	54,297.0	61,888.0	176,514.0	180,317.0	128,430.0	98,521.0	90,706.0	86,586.0	81,121.0	100,334.0
Hardwoods	93.0	51.0	575.0	412.0	59.0	22.0	308.0	151.0	8.0	6.0	56.0	64.0	14.0	12.0	130.0	99.0	12.0	11.0	81.0	98.0
Total	669,400.0	701,070.0	567,754.0	408,599.0	340,588.0	374,971.0	303,639.0	147,595.0	61,566.0	59,173.0	54,353.0	61,952.0	176,528.0	180,329.0	128,560.0	98,620.0	90,718.0	86,597.0	81,202.0	100,432.0
Southern Rocky Mtn:																				
Softwoods	172,790.0	187,914.0	170,614.0	125,727.0	122,502.0	149,079.0	108,420.0	81,739.0	31,174.0	26,435.0	31,276.0	17,204.0	307.0	5,475.0	1,467.0	416.0	18,807.0	6,925.0	29,451.0	26,368.0
Hardwoods	2,961.0	3,476.0	2,915.0	2,185.0	2,107.0	3,024.0	1,981.0	1,498.0	31.0	130.0	372.0	228.0	1.0	57.0	17.0	11.0	822.0	265.0	545.0	448.0
Total	175,751.0	191,390.0	173,529.0	127,912.0	124,609.0	152,103.0	110,401.0	83,237.0	31,205.0	26,565.0	31,648.0	17,432.0	308.0	5,532.0	1,484.0	427.0	19,629.0	7,190.0	29,996.0	26,816.0
Total, Rocky Mtn.:																				
Softwoods	842,097.0	888,933.0	737,793.0	533,914.0	463,031.0	524,028.0	411,751.0	229,183.0	92,732.0	85,602.0	85,573.0	79,092.0	176,821.0	185,792.0	129,897.0	98,937.0	109,513.0	93,511.0	110,572.0	126,702.0
Hardwoods	3,054.0	3,527.0	3,490.0	2,597.0	2,166.0	3,046.0	2,289.0	1,649.0	39.0	136.0	428.0	292.0	15.0	69.0	147.0	110.0	834.0	276.0	626.0	546.0
Total	845,151.0	892,460.0	741,283.0	536,511.0	465,197.0	527,074.0	414,040.0	230,832.0	92,771.0	85,738.0	86,001.0	79,384.0	176,836.0	185,861.0	130,044.0	99,047.0	110,347.0	93,787.0	111,198.0	127,248.0
Total, all regions:																				
Softwoods	10,046,120.0	9,365,155.0	7,623,615.0	7,770,169.0	1,992,617.0	2,162,323.0	1,746,572.0	1,031,646.0	850,759.0	752,254.0	568,986.0	431,366.0	3,633,366.0	3,116,278.0	2,300,935.0	2,765,460.0	3,569,378.0	3,334,300.0	3,007,122.0	3,541,697.0
Hardwoods	4,182,903.0	4,729,003.0	4,335,878.0	4,091,998.0	128,026.0	159,982.0	126,336.0	116,703.0	226,060.0	213,607.0	153,698.0	144,474.0	595,704.0	648,564.0	656,961.0	521,180.0	3,233,113.0	3,706,850.0	3,398,883.0	3,309,641.0
Total	14,229,023.0	14,094,158.0	11,959,493.0	11,862,167.0	2,120,643.0	2,322,305.0	1,872,908.0	1,148,349.0	1,076,819.0	965,861.0	722,684.0	575,840.0	4,229,070.0	3,764,842.0	2,957,896.0	3,286,640.0	6,802,491.0	7,041,150.0	6,406,005.0	6,851,338.0

Table 3.40—*Annual removals of sawtimber on commercial timberland in the United States by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976*

[Thousand board feet, International 1/4-inch log rule]

Section, region and species group	All ownerships 1976	All ownerships 1970	All ownerships 1962	All ownerships 1952	National Forest 1976	National Forest 1970	National Forest 1962	National Forest 1952	Other public 1976	Other public 1970	Other public 1962	Other public 1952	Forest industry 1976	Forest industry 1970	Forest industry 1962	Forest industry 1952	Farmer and other private 1976	Farmer and other private 1970	Farmer and other private 1962	Farmer and other private 1952
New England:																				
Softwoods	1,355,108.0	1,105,723.0	641,000.0	924,000.0	7,411.0	4,899.0	3,626.0	7,015.0	40,001.0	22,726.0	9,454.0	12,849.0	510,352.0	405,559.0	181,851.0	230,499.0	797,344.0	672,539.0	446,069.0	673,637.0
Hardwoods	706,233.0	734,899.0	348,000.0	381,000.0	23,900.0	18,028.0	6,413.0	8,979.0	24,613.0	17,363.0	9,303.0	9,105.0	277,880.0	232,683.0	77,801.0	80,485.0	379,840.0	466,825.0	254,483.0	282,431.0
Total	2,061,341.0	1,840,622.0	989,000.0	1,305,000.0	31,311.0	22,927.0	10,039.0	15,994.0	64,614.0	40,089.0	18,757.0	21,954.0	788,232.0	638,242.0	259,652.0	310,984.0	1,177,184.0	1,139,364.0	700,552.0	956,068.0
Middle Atlantic:																				
Softwoods	266,929.0	369,045.0	305,000.0	409,000.0	2,024.0	6,304.0	5,500.0	3,100.0	5,119.0	6,899.0	5,800.0	5,600.0	55,120.0	54,219.0	36,594.0	50,644.0	204,666.0	301,623.0	257,106.0	349,656.0
Hardwoods	1,686,742.0	1,874,488.0	1,218,000.0	1,078,000.0	41,798.0	56,532.0	20,200.0	16,600.0	61,288.0	111,390.0	64,000.0	51,500.0	108,933.0	60,050.0	39,697.0	33,197.0	1,474,723.0	1,646,516.0	1,094,103.0	976,703.0
Total	1,953,671.0	2,243,533.0	1,523,000.0	1,487,000.0	43,822.0	62,836.0	25,700.0	19,700.0	66,407.0	118,289.0	69,800.0	57,100.0	164,053.0	114,269.0	76,291.0	83,841.0	1,679,389.0	1,948,139.0	1,351,209.0	1,326,359.0
Lake States:																				
Softwoods	528,450.0	468,763.0	406,378.0	412,957.0	115,466.0	78,253.0	76,074.0	47,355.0	130,081.0	112,705.0	96,596.0	87,885.0	110,441.0	94,432.0	80,242.0	120,992.0	172,462.0	183,373.0	153,466.0	156,725.0
Hardwoods	1,515,565.0	1,286,082.0	1,042,190.0	912,663.0	160,008.0	97,144.0	72,318.0	33,898.0	183,637.0	145,185.0	116,739.0	65,515.0	190,899.0	160,841.0	136,887.0	193,040.0	981,021.0	882,912.0	716,246.0	620,210.0
Total	2,044,015.0	1,754,845.0	1,448,568.0	1,325,620.0	275,474.0	175,397.0	148,392.0	81,253.0	313,718.0	257,890.0	213,335.0	153,400.0	301,340.0	255,273.0	217,129.0	314,032.0	1,153,483.0	1,066,285.0	869,712.0	776,935.0
Central States:																				
Softwoods	72,518.0	77,312.0	86,677.0	67,800.0	29,349.0	14,610.0	7,910.0	4,375.0	413.0	919.0	1,325.0	1,075.0	715.0	1,513.0	1,767.0	1,000.0	42,041.0	60,270.0	75,675.0	61,350.0
Hardwoods	2,281,698.0	2,704,856.0	2,323,897.0	2,234,200.0	66,320.0	46,829.0	54,888.0	52,688.0	36,896.0	40,562.0	28,654.0	39,578.0	28,952.0	43,368.0	34,557.0	37,521.0	2,149,530.0	2,574,097.0	2,205,798.0	2,104,413.0
Total	2,354,216.0	2,782,168.0	2,410,574.0	2,302,000.0	95,669.0	61,439.0	62,798.0	57,063.0	37,309.0	41,481.0	29,979.0	40,653.0	29,667.0	44,881.0	36,324.0	38,521.0	2,191,571.0	2,634,367.0	2,281,473.0	2,165,763.0
Total, North:																				
Softwoods	2,223,005.0	2,020,843.0	1,439,055.0	1,813,757.0	154,250.0	104,066.0	93,110.0	61,845.0	175,614.0	143,249.0	113,175.0	107,409.0	676,628.0	555,723.0	300,454.0	403,135.0	1,216,513.0	1,217,805.0	932,316.0	1,241,368.0
Hardwoods	6,190,238.0	6,600,325.0	4,932,087.0	4,605,863.0	292,026.0	218,533.0	153,819.0	112,165.0	306,434.0	314,500.0	218,696.0	165,698.0	606,664.0	496,942.0	288,942.0	344,243.0	4,985,114.0	5,570,350.0	4,270,630.0	3,983,757.0
Total	8,413,243.0	8,621,168.0	6,371,142.0	6,419,620.0	446,276.0	322,599.0	246,929.0	174,010.0	482,048.0	457,749.0	331,871.0	273,107.0	1,283,292.0	1,052,665.0	589,396.0	747,378.0	6,201,627.0	6,788,155.0	5,202,946.0	5,225,125.0
South Atlantic:																				
Softwoods	3,563,978.0	2,695,232.0	2,503,900.0	3,239,000.0	108,390.0	88,140.0	47,519.0	51,984.0	118,924.0	85,459.0	71,900.0	96,300.0	855,432.0	633,488.0	362,100.0	542,000.0	2,481,232.0	1,888,145.0	2,022,381.0	2,548,716.0
Hardwoods	2,207,306.0	2,033,757.0	1,922,700.0	2,029,700.0	51,471.0	83,999.0	62,100.0	47,256.0	72,135.0	40,923.0	21,200.0	25,200.0	289,401.0	290,493.0	262,700.0	327,800.0	1,794,299.0	1,618,342.0	1,576,700.0	1,629,444.0
Total	5,771,284.0	4,728,989.0	4,426,600.0	5,268,700.0	159,861.0	172,139.0	109,619.0	99,240.0	191,059.0	126,382.0	93,100.0	121,500.0	1,144,833.0	923,981.0	624,800.0	869,800.0	4,275,531.0	3,506,487.0	3,599,081.0	4,178,160.0
East Gulf:																				
Softwoods	3,834,292.0	3,756,481.0	3,262,830.0	3,483,000.0	103,069.0	55,390.0	65,809.0	89,070.0	185,781.0	182,199.0	104,590.0	101,900.0	1,034,917.0	1,017,452.0	677,044.0	725,700.0	2,510,525.0	2,501,440.0	2,415,387.0	2,566,330.0
Hardwoods	1,045,788.0	908,118.0	1,049,148.0	1,257,600.0	18,209.0	22,721.0	21,386.0	16,246.0	38,738.0	33,056.0	14,071.0	13,600.0	160,421.0	157,731.0	198,749.0	232,100.0	828,420.0	694,610.0	814,942.0	995,654.0
Total	4,880,080.0	4,664,599.0	4,311,978.0	4,740,600.0	121,278.0	78,111.0	87,195.0	105,316.0	224,519.0	215,255.0	118,661.0	115,500.0	1,195,338.0	1,175,183.0	875,793.0	957,800.0	3,338,945.0	3,196,050.0	3,230,329.0	3,561,984.0
Central Gulf:																				
Softwoods	5,170,612.0	4,024,233.0	2,350,000.0	2,761,000.0	270,073.0	381,400.0	180,300.0	340,300.0	177,610.0	76,935.0	51,600.0	127,000.0	1,398,248.0	873,498.0	452,700.0	962,100.0	3,324,681.0	2,692,400.0	1,665,400.0	1,331,600.0
Hardwoods	2,546,895.0	2,242,197.0	2,189,000.0	2,557,000.0	62,380.0	59,797.0	52,600.0	71,000.0	137,741.0	86,757.0	45,700.0	86,800.0	374,951.0	254,824.0	331,100.0	223,900.0	1,971,823.0	1,840,819.0	1,759,600.0	2,175,300.0
Total	7,717,507.0	6,266,430.0	4,539,000.0	5,318,000.0	332,453.0	441,197.0	232,900.0	411,300.0	315,351.0	163,692.0	97,300.0	213,800.0	1,773,199.0	1,128,322.0	783,800.0	1,186,000.0	5,296,504.0	4,533,219.0	3,425,000.0	3,506,900.0
West Gulf:																				
Softwoods	6,369,579.0	4,417,816.0	2,774,000.0	2,398,000.0	751,915.0	440,382.0	277,900.0	321,200.0	77,219.0	58,275.0	74,900.0	29,300.0	3,316,798.0	2,017,253.0	1,111,000.0	1,347,600.0	2,223,647.0	1,901,906.0	1,310,200.0	699,900.0
Hardwoods	1,898,355.0	3,019,454.0	2,381,000.0	2,425,000.0	38,776.0	103,512.0	72,800.0	100,400.0	79,200.0	70,394.0	51,300.0	72,100.0	512,031.0	578,237.0	627,100.0	412,100.0	1,268,348.0	2,267,311.0	1,629,800.0	1,840,400.0
Total	8,267,934.0	7,437,270.0	5,155,000.0	4,823,000.0	790,691.0	543,894.0	350,700.0	421,600.0	156,419.0	128,669.0	126,200.0	101,400.0	3,828,829.0	2,595,490.0	1,738,100.0	1,759,700.0	3,491,995.0	4,169,217.0	2,940,000.0	2,540,300.0
Total, South:																				
Softwoods	18,938,461.0	14,893,762.0	10,890,730.0	11,881,000.0	1,233,447.0	965,312.0	571,528.0	802,554.0	559,534.0	402,868.0	302,990.0	354,500.0	6,605,395.0	4,541,691.0	2,602,844.0	3,577,400.0	10,540,085.0	8,983,891.0	7,413,368.0	7,146,546.0
Hardwoods	7,698,344.0	8,203,526.0	7,541,848.0	8,269,300.0	170,836.0	270,029.0	208,886.0	234,902.0	327,814.0	231,130.0	132,271.0	197,700.0	1,336,804.0	1,281,285.0	1,419,649.0	1,195,900.0	5,862,890.0	6,421,082.0	5,781,042.0	6,640,798.0
Total	26,636,805.0	23,097,288.0	18,432,578.0	20,150,300.0	1,404,283.0	1,235,341.0	780,414.0	1,037,456.0	887,348.0	633,998.0	435,261.0	552,200.0	7,942,199.0	5,822,976.0	4,022,493.0	4,773,300.0	16,402,975.0	15,404,973.0	13,194,410.0	13,787,344.0
Pacific Northwest: Douglas-fir subregion (Western Oregon and western Washington):																				
Softwoods	15,564,203.0	15,084,000.0	12,479,000.0	12,909,000.0	3,314,764.0	3,450,000.0	3,726,000.0	2,419,000.0	2,987,931.0	2,400,000.0	1,833,000.0	1,075,000.0	8,140,269.0	7,830,000.0	5,839,000.0	7,666,000.0	1,121,239.0	1,404,000.0	1,081,000.0	1,749,000.0
Hardwoods	359,890.0	310,000.0	207,000.0	122,000.0	2,469.0	24,000.0	4,000.0	.0	55,076.0	50,000.0	8,000.0	22,000.0	139,519.0	156,000.0	89,000.0	73,000.0	162,826.0	80,000.0	106,000.0	27,000.0
Total	15,924,093.0	15,394,000.0	12,686,000.0	13,031,000.0	3,317,233.0	3,474,000.0	3,730,000.0	2,419,000.0	3,043,007.0	2,450,000.0	1,841,000.0	1,097,000.0	8,279,788.0	7,986,000.0	5,928,000.0	7,739,000.0	1,284,065.0	1,484,000.0	1,187,000.0	1,776,000.0

Table 3.40—*Annual removals of sawtimber on commercial timberland in the United States by ownership, section, region, and softwoods and hardwoods, 1952, 1962, 1970, and 1976—Cont'd.*

[Thousand board feet, International 1/4-inch log rule]

Section, region and	All ownerships				National Forest				Other public				Forest industry				Farmer and other private			
species group	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952	1976	1970	1962	1952
Pine subregion (Eastern Oregon and eastern Washington):																				
Softwoods	3,548,759.0	3,491,000.0	2,937,000.0	2,332,000.0	1,749,121.0	1,924,000.0	1,602,000.0	768,000.0	534,788.0	605,000.0	382,000.0	312,000.0	903,953.0	693,000.0	563,000.0	632,000.0	360,897.0	269,000.0	390,000.0	620,000.0
Hardwoods	107.0	5,700.0	2,900.0	2,200.0	6.0	4,500.0	1,500.0	1,200.0	49.0	400.0	100.0	100.0	.0	.0	.0	.0	52.0	800.0	1,300.0	900.0
Total	3,548,866.0	3,496,700.0	2,939,900.0	2,334,200.0	1,749,127.0	1,928,500.0	1,603,500.0	769,200.0	534,837.0	605,400.0	382,100.0	312,100.0	903,953.0	693,000.0	563,000.0	632,000.0	360,949.0	269,800.0	391,300.0	620,900.0
Coastal Alaska:																				
Softwoods	663,611.0	1,079,585.0	617,433.0	108,526.0	621,140.0	984,337.0	594,588.0	104,511.0	33,180.0	73,882.0	22,845.0	4,015.0	.0	.0	.0	.0	9,291.0	21,366.0	.0	.0
Hardwoods	138.0	.0	.0	.0	138.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	663,749.0	1,079,585.0	617,433.0	108,526.0	621,278.0	984,337.0	594,588.0	104,511.0	33,180.0	73,882.0	22,845.0	4,015.0	.0	.0	.0	.0	9,291.0	21,366.0	.0	.0
Interior Alaska:																				
Softwoods	9,165.0	9,165.0	9,165.0	9,165.0	.0	.0	.0	.0	8,550.0	8,550.0	8,550.0	8,550.0	.0	.0	.0	.0	615.0	615.0	615.0	615.0
Hardwoods	18,570.0	18,570.0	18,570.0	18,570.0	.0	.0	.0	.0	18,570.0	18,570.0	18,570.0	18,570.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	27,735.0	27,735.0	27,735.0	27,735.0	.0	.0	.0	.0	27,120.0	27,120.0	27,120.0	27,120.0	.0	.0	.0	.0	615.0	615.0	615.0	615.0
Total, Pacific Northwest:																				
Softwoods	19,785,738.0	19,663,750.0	16,042,598.0	15,358,691.0	5,685,025.0	6,358,337.0	5,922,588.0	3,291,511.0	3,564,449.0	3,087,432.0	2,246,395.0	1,399,565.0	9,044,222.0	8,523,000.0	6,402,000.0	8,298,000.0	1,492,042.0	1,694,981.0	1,471,615.0	2,369,615.0
Hardwoods	378,705.0	334,270.0	228,470.0	142,770.0	2,613.0	28,500.0	5,500.0	1,200.0	73,695.0	68,970.0	26,670.0	40,670.0	139,519.0	156,000.0	89,000.0	73,000.0	162,878.0	80,800.0	107,300.0	27,900.0
Total	20,164,443.0	19,998,020.0	16,271,068.0	15,501,461.0	5,687,638.0	6,386,837.0	5,928,088.0	3,292,711.0	3,638,144.0	3,156,402.0	2,273,065.0	1,440,235.0	9,183,741.0	8,679,000.0	6,491,000.0	8,371,000.0	1,654,920.0	1,775,781.0	1,578,915.0	2,397,515.0
Pacific Southwest:																				
Softwoods	5,072,404.0	5,581,000.0	6,046,000.0	6,941,000.0	1,897,079.0	2,532,000.0	1,657,000.0	815,000.0	147,100.0	172,000.0	112,000.0	33,000.0	2,130,409.0	1,822,000.0	2,619,000.0	2,687,000.0	897,816.0	1,055,000.0	1,658,000.0	3,406,000.0
Hardwoods	47,365.0	56,593.0	39,000.0	24,000.0	2,132.0	20,000.0	13,000.0	7,000.0	11,253.0	4,285.0	4,185.0	3,185.0	9,887.0	12,000.0	7,000.0	4,000.0	24,093.0	20,308.0	14,815.0	9,815.0
Total	5,119,769.0	5,637,593.0	6,085,000.0	6,965,000.0	1,899,211.0	2,552,000.0	1,670,000.0	822,000.0	158,353.0	176,285.0	116,185.0	36,185.0	2,140,296.0	1,834,000.0	2,626,000.0	2,691,000.0	921,909.0	1,075,308.0	1,672,815.0	3,415,815.0
Total, Pacific Coast:																				
Softwoods	24,858,142.0	25,244,750.0	22,088,598.0	22,299,691.0	7,582,104.0	8,890,337.0	7,579,588.0	4,106,511.0	3,711,549.0	3,259,432.0	2,358,395.0	1,432,565.0	11,174,631.0	10,345,000.0	9,021,000.0	10,985,000.0	2,389,858.0	2,749,981.0	3,129,615.0	5,775,615.0
Hardwoods	426,070.0	390,863.0	267,470.0	166,770.0	4,745.0	48,500.0	18,500.0	8,200.0	84,948.0	73,255.0	30,855.0	43,855.0	149,406.0	168,000.0	96,000.0	77,000.0	186,971.0	101,108.0	122,115.0	37,715.0
Total	25,284,212.0	25,635,613.0	22,356,068.0	22,466,461.0	7,586,849.0	8,938,837.0	7,598,088.0	4,114,711.0	3,796,497.0	3,332,687.0	2,389,250.0	1,476,420.0	11,324,037.0	10,513,000.0	9,117,000.0	11,062,000.0	2,576,829.0	2,851,089.0	3,251,730.0	5,813,330.0
Northern Rocky Mtn.:																				
Softwoods	3,845,997.0	3,917,873.0	3,323,813.0	2,430,684.0	1,959,206.0	2,049,096.0	1,748,232.0	853,760.0	352,023.0	341,568.0	333,259.0	381,084.0	1,013,754.0	1,030,648.0	769,314.0	618,013.0	521,014.0	496,561.0	473,008.0	577,827.0
Hardwoods	550.0	304.0	3,410.0	2,489.0	355.0	127.0	1,776.0	865.0	40.0	33.0	353.0	399.0	85.0	79.0	800.0	643.0	70.0	65.0	481.0	582.0
Total	3,846,547.0	3,918,177.0	3,327,223.0	2,433,173.0	1,959,561.0	2,049,223.0	1,750,008.0	854,625.0	352,063.0	341,601.0	333,612.0	381,483.0	1,013,839.0	1,030,727.0	770,114.0	618,656.0	521,084.0	496,626.0	473,489.0	578,409.0
Southern Rocky Mtn.:																				
Softwoods	981,664.0	1,062,694.0	963,230.0	753,455.0	698,999.0	835,181.0	678,498.0	525,480.0	171,491.0	156,484.0	147,758.0	80,062.0	1,710.0	32,300.0	8,376.0	2,349.0	109,464.0	38,729.0	128,598.0	145,564.0
Hardwoods	14,147.0	12,095.0	16,365.0	13,140.0	11,035.0	10,478.0	12,178.0	9,476.0	150.0	621.0	1,670.0	1,164.0	2.0	333.0	92.0	65.0	2,960.0	663.0	2,425.0	2,435.0
Total	995,811.0	1,074,789.0	979,595.0	766,595.0	710,034.0	845,659.0	690,676.0	534,956.0	171,641.0	157,105.0	149,428.0	81,226.0	1,712.0	32,633.0	8,468.0	2,414.0	112,424.0	39,392.0	131,023.0	147,999.0
Total, Rocky Mtn.:																				
Softwoods	4,827,661.0	4,980,567.0	4,287,043.0	3,184,139.0	2,658,205.0	2,884,277.0	2,426,730.0	1,379,240.0	523,514.0	498,052.0	481,017.0	461,146.0	1,015,464.0	1,062,948.0	777,690.0	620,362.0	630,478.0	535,290.0	601,606.0	723,391.0
Hardwoods	14,697.0	12,399.0	19,775.0	15,629.0	11,390.0	10,605.0	13,954.0	10,341.0	190.0	654.0	2,023.0	1,563.0	87.0	412.0	892.0	708.0	3,030.0	728.0	2,906.0	3,017.0
Total	4,842,358.0	4,992,966.0	4,306,818.0	3,199,768.0	2,669,595.0	2,894,882.0	2,440,684.0	1,389,581.0	523,704.0	498,706.0	483,040.0	462,709.0	1,015,551.0	1,063,360.0	778,582.0	621,070.0	633,508.0	536,018.0	604,512.0	726,408.0
Total, all regions:																				
Softwoods	50,847,269.0	47,139,922.0	38,705,426.0	39,178,587.0	11,628,006.0	12,843,992.0	10,670,956.0	6,350,150.0	4,970,211.0	4,303,601.0	3,255,577.0	2,355,620.0	19,472,118.0	16,505,362.0	12,701,988.0	15,585,897.0	14,776,934.0	13,486,967.0	12,076,905.0	14,886,920.0
Hardwoods	14,329,349.0	15,207,113.0	12,761,180.0	13,057,562.0	478,997.0	547,667.0	395,159.0	365,608.0	719,386.0	619,539.0	383,845.0	408,816.0	2,092,961.0	1,946,639.0	1,805,483.0	1,617,851.0	11,038,005.0	12,093,268.0	10,176,693.0	10,665,287.0
Total	65,176,618.0	62,347,035.0	51,466,606.0	52,236,149.0	12,107,003.0	13,391,659.0	11,066,115.0	6,715,758.0	5,689,597.0	4,923,140.0	3,639,422.0	2,764,436.0	21,565,079.0	18,452,001.0	14,507,471.0	17,203,748.0	25,814,939.0	25,580,235.0	22,253,598.0	25,552,207.0

Table 3.41—*Annual removals of growing stock on commercial timberland in the eastern United States, by species, section, and region, 1976*

[Thousand cubic feet]

Section and region	All species	Softwoods: Total softwoods	Softwoods: Southern yellow pines	Softwoods: Eastern white and red pines	Softwoods: Spruce and balsam fir	Softwoods: Other eastern softwoods	Hardwoods: Total hardwoods	Hardwoods: Select white and red oaks	Hardwoods: Other white and red oaks	Hardwoods: Hickory	Hardwoods: Yellow birch	Hardwoods: Hard maple	Hardwoods: Sweetgum	Hardwoods: Ash, black walnut and black cherry	Hardwoods: Yellow-poplar	Hardwoods: Other eastern hardwoods
New England	639,199.0	395,638.0	250.0	125,715.0	190,310.0	79,363.0	243,561.0	35,064.0	7,212.0	1,326.0	33,656.0	45,566.0	.0	19,134.0	202.0	101,401.0
Middle Atlantic	663,071.0	102,938.0	38,186.0	33,779.0	3,981.0	26,992.0	560,133.0	125,842.0	85,663.0	22,142.0	5,307.0	49,726.0	9,480.0	65,380.0	41,808.0	154,785.0
Lake States	719,407.0	181,307.0	307.0	21,592.0	55,468.0	103,940.0	538,100.0	70,177.0	14,229.0	2,162.0	10,995.0	47,967.0	.0	18,096.0	.0	374,474.0
Central States	637,158.0	25,474.0	21,914.0	.0	.0	3,560.0	611,684.0	161,079.0	159,418.0	36,894.0	.0	14,112.0	5,556.0	37,853.0	28,617.0	168,155.0
Total, North	2,658,835.0	705,357.0	60,657.0	181,086.0	249,759.0	213,855.0	1,953,478.0	392,162.0	266,522.0	62,524.0	49,958.0	157,371.0	15,036.0	140,463.0	70,627.0	798,815.0
South Atlantic	1,664,206.0	981,152.0	934,101.0	19,840.0	.0	27,211.0	683,054.0	140,098.0	161,396.0	37,356.0	618.0	1,419.0	86,016.0	14,583.0	94,122.0	147,446.0
East Gulf	1,367,119.0	1,047,652.0	1,024,405.0	1,058.0	.0	22,189.0	319,467.0	28,022.0	88,030.0	20,088.0	.0	324.0	56,619.0	8,066.0	31,835.0	86,483.0
Central Gulf	1,759,728.0	1,138,513.0	1,112,703.0	2,893.0	.0	22,917.0	621,215.0	88,778.0	198,170.0	61,710.0	.0	3,415.0	73,370.0	21,336.0	26,778.0	147,658.0
West Gulf	1,780,183.0	1,303,803.0	1,289,992.0	.0	.0	13,811.0	476,380.0	55,141.0	189,969.0	40,333.0	.0	303.0	71,304.0	19,738.0	202.0	99,390.0
Total, South	6,571,236.0	4,471,120.0	4,361,201.0	23,791.0	.0	86,128.0	2,100,116.0	312,039.0	637,565.0	159,487.0	618.0	5,461.0	287,309.0	63,723.0	152,937.0	480,977.0
Total, eastern regions	9,230,071.0	5,176,477.0	4,421,858.0	204,877.0	249,759.0	299,983.0	4,053,594.0	704,201.0	904,087.0	222,011.0	50,576.0	162,832.0	302,345.0	204,186.0	223,564.0	1,279,792.0

Table 3.42—*Annual removals of sawtimber on commercial timberland in the eastern United States, by species, section, and region, 1976*

[Thousand board feet, International 1/4-inch log rule]

Section and region	All species	Softwoods: Total softwoods	Softwoods: Southern yellow pines	Softwoods: Eastern white and red pines	Softwoods: Spruce and balsam fir	Softwoods: Other eastern softwoods	Hardwoods: Total hardwoods	Hardwoods: Select white and red oaks	Hardwoods: Other white and red oaks	Hardwoods: Hickory	Hardwoods: Yellow birch	Hardwoods: Hard maple	Hardwoods: Sweetgum	Hardwoods: Ash, black walnut and black cherry	Hardwoods: Yellow-poplar	Hardwoods: Other eastern hardwoods
New England	2,061,341.0	1,355,108.0	339.0	550,794.0	551,123.0	252,852.0	706,233.0	107,893.0	17,630.0	1,532.0	105,380.0	116,166.0	.0	67,354.0	336.0	289,942.0
Middle Atlantic	1,953,671.0	266,929.0	85,976.0	62,584.0	17,748.0	100,621.0	1,686,742.0	368,229.0	191,019.0	40,589.0	17,068.0	221,313.0	29,824.0	119,044.0	106,468.0	593,188.0
Lake States	2,044,015.0	528,450.0	1,008.0	92,806.0	146,420.0	288,216.0	1,515,565.0	232,992.0	41,989.0	3,679.0	49,185.0	195,433.0	.0	47,783.0	.0	944,504.0
Central States	2,354,216.0	72,518.0	60,483.0	.0	.0	12,035.0	2,281,698.0	609,495.0	600,029.0	112,312.0	.0	65,595.0	20,793.0	147,514.0	132,414.0	593,546.0
Total, North	8,413,243.0	2,223,005.0	147,806.0	706,184.0	715,291.0	653,724.0	6,190,238.0	1,318,609.0	850,667.0	158,112.0	171,633.0	598,507.0	50,617.0	381,695.0	239,218.0	2,421,180.0
South Atlantic	5,771,284.0	3,563,978.0	3,371,487.0	87,718.0	.0	104,773.0	2,207,306.0	441,872.0	509,655.0	127,839.0	2,672.0	2,893.0	280,064.0	35,886.0	349,604.0	456,821.0
East Gulf	4,880,080.0	3,834,292.0	3,745,852.0	6,229.0	.0	82,211.0	1,045,788.0	106,099.0	283,458.0	81,048.0	.0	1,033.0	187,621.0	22,866.0	113,643.0	250,020.0
Central Gulf	7,717,507.0	5,170,612.0	5,065,187.0	13,666.0	.0	91,759.0	2,546,895.0	409,376.0	782,487.0	262,923.0	.0	17,161.0	261,182.0	77,751.0	144,189.0	591,826.0
West Gulf	8,267,934.0	6,369,579.0	6,306,980.0	.0	.0	62,599.0	1,898,355.0	262,316.0	753,723.0	153,431.0	.0	495.0	260,351.0	76,018.0	591.0	391,430.0
Total, South	26,636,805.0	18,938,461.0	18,489,506.0	107,613.0	.0	341,342.0	7,698,344.0	1,219,663.0	2,329,323.0	625,241.0	2,672.0	21,582.0	989,218.0	212,521.0	608,027.0	1,690,097.0
Total, eastern regions	35,050,048.0	21,161,466.0	18,637,312.0	813,797.0	715,291.0	995,066.0	13,888,582.0	2,538,272.0	3,179,990.0	783,353.0	174,305.0	620,089.0	1,039,835.0	594,216.0	847,245.0	4,111,277.0

Table 3.43—*Annual removals of growing stock on commercial timberland in the western United States, by species, section, and region, 1976*

[Thousand cubic feet]

Section and region	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	Western white and sugar pines	Western hemlock	True firs	Redwood	Other western softwoods	Western hardwoods
Pacific Northwest:										
Douglas-fir subregion (Western Oregon and western Washington)	2,572,906.0	2,466,649.0	1,464,954.0	30,684.0	13,934.0	658,066.0	120,121.0	.0	178,890.0	106,257.0
Pine subregion (Eastern Oregon and eastern Washington)	635,087.0	635,058.0	130,529.0	319,687.0	4,466.0	14,608.0	82,548.0	.0	83,220.0	29.0
Coastal Alaska	105,908.0	105,886.0	.0	.0	.0	71,579.0	.0	.0	34,307.0	22.0
Interior Alaska	4,693.0	1,551.0	.0	.0	.0	.0	.0	.0	1,551.0	3,142.0
Total, Pacific Northwest	3,318,594.0	3,209,144.0	1,595,483.0	350,371.0	18,400.0	744,253.0	202,669.0	.0	297,968.0	109,450.0
Pacific Southwest	835,207.0	818,402.0	216,297.0	146,769.0	73,134.0	3,106.0	185,941.0	139,757.0	53,398.0	16,805.0
Total, Pacific Coast	4,153,801.0	4,027,546.0	1,811,780.0	497,140.0	91,534.0	747,359.0	388,610.0	139,757.0	351,366.0	126,255.0
Northern Rocky Mtn	669,400.0	669,307.0	133,319.0	121,901.0	74,200.0	6,039.0	104,121.0	.0	229,727.0	93.0
Southern Rocky Mtn	175,751.0	172,790.0	19,701.0	105,358.0	4.0	.0	10,467.0	.0	37,260.0	2,961.0
Total, Rocky Mtn	845,151.0	842,097.0	153,020.0	227,259.0	74,204.0	6,039.0	114,588.0	.0	266,987.0	3,054.0
Total, western regions	4,998,952.0	4,869,643.0	1,964,800.0	724,399.0	165,738.0	753,398.0	503,198.0	139,757.0	618,353.0	129,309.0

Table 3.44—*Annual removals of sawtimber on commercial timberland in the western United States, by species, section, and region, 1976*

[Thousand board feet, International 1/4-inch log rule]

Section and region	All species	Softwoods: Total softwoods	Douglas-fir	Ponderosa and Jeffrey pine	Western white and sugar pines	Western hemlock	True firs	Redwood	Other western softwoods	Western hardwoods
Pacific Northwest:										
Douglas-fir subregion (Western Oregon and western Washington)	15,924,093.0	15,564,203.0	9,289,323.0	189,927.0	76,640.0	4,149,161.0	737,020.0	.0	1,122,132.0	359,890.0
Pine subregion (Eastern Oregon and eastern Washington)	3,548,866.0	3,548,759.0	731,000.0	1,823,579.0	24,844.0	84,848.0	442,336.0	.0	442,152.0	107.0
Coastal Alaska	663,749.0	663,611.0	.0	.0	.0	448,601.0	.0	.0	215,010.0	138.0
Interior Alaska	27,735.0	9,165.0	.0	.0	.0	.0	.0	.0	9,165.0	18,570.0
Total, Pacific Northwest	20,164,443.0	19,785,738.0	10,020,323.0	2,013,506.0	101,484.0	4,682,610.0	1,179,356.0	.0	1,788,459.0	378,705.0
Pacific Southwest	5,119,769.0	5,072,404.0	1,326,022.0	942,917.0	460,683.0	18,293.0	1,177,377.0	820,132.0	326,980.0	47,365.0
Total, Pacific Coast	25,284,212.0	24,858,142.0	11,346,345.0	2,956,423.0	562,167.0	4,700,903.0	2,356,733.0	820,132.0	2,115,439.0	426,070.0
Northern Rocky Mtn	3,846,547.0	3,845,997.0	766,520.0	703,015.0	435,858.0	34,237.0	609,882.0	.0	1,296,485.0	550.0
Southern Rocky Mtn	995,811.0	981,664.0	114,374.0	608,353.0	22.0	.0	62,194.0	.0	196,721.0	14,147.0
Total, Rocky Mtn	4,842,358.0	4,827,661.0	880,894.0	1,311,368.0	435,880.0	34,237.0	672,076.0	.0	1,493,206.0	14,697.0
Total, western regions	30,126,570.0	29,685,803.0	12,227,239.0	4,267,791.0	998,047.0	4,735,140.0	3,028,809.0	820,132.0	3,608,645.0	440,767.0

Table 3.45—*Net annual growth, removals, and mortality of growing stock on commercial timberland in the United States, by softwoods and hardwoods, and section, region, and State, 1976*

[Thousand cubic feet]

Section, region and State	All species			Softwoods			Hardwoods		
	Growth	Removals	Mortality	Growth	Removals	Mortality	Growth	Removals	Mortality
New England:									
Connecticut	81,823.0	16,767.0	16,267.0	16,593.0	2,175.0	1,589.0	65,230.0	14,592.0	14,678.0
Maine	742,978.0	446,137.0	143,882.0	576,906.0	298,980.0	107,227.0	166,072.0	147,157.0	36,655.0
Massachusetts	141,806.0	35,354.0	18,391.0	53,430.0	19,019.0	5,868.0	88,376.0	16,335.0	12,523.0
New Hampshire	251,692.0	69,241.0	14,709.0	136,049.0	41,286.0	8,178.0	115,643.0	27,955.0	6,531.0
Rhode Island	17,359.0	3,029.0	1,421.0	7,931.0	376.0	14.0	9,428.0	2,653.0	1,407.0
Vermont	108,973.0	68,671.0	31,465.0	47,291.0	33,802.0	14,521.0	61,682.0	34,869.0	16,944.0
Total	1,344,631.0	639,199.0	226,135.0	838,200.0	395,638.0	137,397.0	506,431.0	243,561.0	88,738.0
Middle Atlantic:									
Delaware	19,972.0	11,190.0	3,974.0	3,966.0	6,071.0	783.0	16,006.0	5,119.0	3,191.0
Maryland	111,000.0	63,475.0	16,100.0	24,900.0	20,801.0	4,200.0	86,100.0	42,674.0	11,900.0
New Jersey	27,013.0	11,917.0	11,916.0	4,950.0	5,141.0	1,241.0	22,063.0	6,776.0	10,675.0
New York	301,579.0	164,503.0	128,303.0	85,590.0	46,855.0	33,141.0	215,989.0	117,648.0	95,162.0
Pennsylvania	847,944.0	245,210.0	96,027.0	48,567.0	13,183.0	5,808.0	799,377.0	232,027.0	90,219.0
West Virginia	487,703.0	166,776.0	65,862.0	61,098.0	10,887.0	8,974.0	426,605.0	155,889.0	56,888.0
Total	1,795,211.0	663,071.0	322,182.0	229,071.0	102,938.0	54,147.0	1,566,140.0	560,133.0	268,035.0
Lake States:									
Michigan	704,243.0	254,400.0	304,913.0	199,132.0	68,300.0	78,548.0	505,111.0	186,100.0	226,365.0
Minnesota	346,095.0	193,600.0	140,853.0	116,956.0	68,800.0	33,040.0	229,139.0	124,800.0	107,813.0
North Dakota	4,986.0	2,607.0	10,677.0	7.0	7.0	.0	4,979.0	2,600.0	10,677.0
South Dakota (East)	5,743.0	1,300.0	1,013.0	1,063.0	300.0	15.0	4,680.0	1,000.0	998.0
Wisconsin	556,340.0	267,500.0	71,579.0	146,286.0	43,900.0	18,807.0	410,054.0	223,600.0	52,772.0
Total	1,617,407.0	719,407.0	529,035.0	463,444.0	181,307.0	130,410.0	1,153,963.0	538,100.0	398,625.0
Central:									
Illinois	85,800.0	89,200.0	18,507.0	1,767.0	1,000.0	31.0	84,033.0	88,200.0	18,476.0
Indiana	106,013.0	61,000.0	12,852.0	4,645.0	1,800.0	140.0	101,368.0	59,200.0	12,712.0
Iowa	50,940.0	54,600.0	6,885.0	303.0	200.0	51.0	50,637.0	54,400.0	6,834.0
Kansas	18,095.0	9,905.0	16,170.0	47.0	5.0	2.0	18,048.0	9,900.0	16,168.0
Kentucky	402,297.0	142,460.0	41,566.0	39,535.0	12,335.0	4,234.0	362,762.0	130,125.0	37,332.0
Missouri	182,366.0	168,600.0	12,900.0	13,751.0	8,400.0	409.0	168,615.0	160,200.0	12,491.0
Nebraska	14,556.0	7,700.0	1,601.0	3,700.0	600.0	141.0	10,856.0	7,100.0	1,460.0
Ohio	174,436.0	103,693.0	31,739.0	5,321.0	1,134.0	1,751.0	169,115.0	102,559.0	29,988.0
Total	1,034,503.0	637,158.0	142,220.0	69,069.0	25,474.0	6,759.0	965,434.0	611,684.0	135,461.0
Total, North	5,791,752.0	2,658,835.0	1,219,572.0	1,599,784.0	705,357.0	328,713.0	4,191,968.0	1,953,478.0	890,859.0
South Atlantic:									
North Carolina	1,168,834.0	666,005.0	144,191.0	545,298.0	412,627.0	78,146.0	623,536.0	253,378.0	66,045.0
South Carolina	755,803.0	502,203.0	79,336.0	472,139.0	363,300.0	35,180.0	283,664.0	138,903.0	44,156.0
Virginia	823,168.0	495,998.0	119,544.0	247,205.0	205,225.0	62,104.0	575,963.0	290,773.0	57,440.0
Total	2,747,805.0	1,664,206.0	343,071.0	1,264,642.0	981,152.0	175,430.0	1,483,163.0	683,054.0	167,641.0
East Gulf:									
Florida	568,507.0	326,010.0	74,560.0	443,310.0	269,667.0	31,929.0	125,197.0	56,343.0	42,631.0
Georgia	1,757,364.0	1,041,109.0	169,346.0	1,279,042.0	777,985.0	92,835.0	478,322.0	263,124.0	76,511.0
Total	2,325,871.0	1,367,119.0	243,906.0	1,722,352.0	1,047,652.0	124,764.0	603,519.0	319,467.0	119,142.0
Central Gulf:									
Alabama	1,291,770.0	830,084.0	112,116.0	839,266.0	611,813.0	53,303.0	452,504.0	218,271.0	58,813.0
Mississippi	1,013,200.0	733,500.0	121,700.0	589,500.0	492,400.0	56,000.0	423,700.0	241,100.0	65,700.0
Tennessee	605,049.0	196,144.0	50,443.0	126,333.0	34,300.0	9,390.0	478,716.0	161,844.0	41,053.0
Total	2,910,019.0	1,759,728.0	284,259.0	1,555,099.0	1,138,513.0	118,693.0	1,354,920.0	621,215.0	165,566.0
West Gulf:									
Arkansas	918,184.0	601,234.0	77,254.0	457,424.0	382,304.0	22,480.0	460,760.0	218,930.0	54,774.0
Louisiana	948,144.0	617,423.0	111,235.0	613,478.0	455,820.0	40,591.0	334,666.0	161,603.0	70,644.0
Oklahoma	116,800.0	82,175.0	9,300.0	55,900.0	61,420.0	1,900.0	60,900.0	20,755.0	7,400.0
Texas	737,837.0	479,351.0	51,854.0	489,162.0	404,259.0	28,303.0	248,675.0	75,092.0	23,551.0
Total	2,720,965.0	1,780,183.0	249,643.0	1,615,964.0	1,303,803.0	93,274.0	1,105,001.0	476,380.0	156,369.0
Total, South	10,704,660.0	6,571,236.0	1,120,879.0	6,158,057.0	4,471,120.0	512,161.0	4,546,603.0	2,100,116.0	608,718.0

Table 3.45—*Net annual growth, removals, and mortality of growing stock on commercial timberland in the United States, by softwoods and hardwoods, and section, region, and State, 1976—Cont'd.*

[Thousand cubic feet]

Section, region and State	All species Growth	All species Removals	All species Mortality	Softwoods Growth	Softwoods Removals	Softwoods Mortality	Hardwoods Growth	Hardwoods Removals	Hardwoods Mortality
Pacific Northwest:									
Alaska:									
Coastal	24,424.0	105,908.0	160,795.0	24,400.0	105,886.0	158,300.0	24.0	22.0	2,495.0
Interior	102,090.0	4,693.0	10,029.0	41,400.0	1,551.0	7,539.0	60,690.0	3,142.0	2,490.0
Summary	126,514.0	110,601.0	170,824.0	65,800.0	107,437.0	165,839.0	60,714.0	3,164.0	4,985.0
Oregon:									
Western	894,000.0	1,427,602.0	305,500.0	743,800.0	1,407,221.0	263,300.0	150,200.0	20,381.0	42,200.0
Eastern	364,900.0	444,537.0	120,500.0	364,900.0	444,529.0	120,300.0	.0	8.0	200.0
Summary	1,258,900.0	1,872,139.0	426,000.0	1,108,700.0	1,851,750.0	383,600.0	150,200.0	20,389.0	42,400.0
Washington:									
Western	1,047,600.0	1,145,304.0	249,500.0	800,800.0	1,059,428.0	221,100.0	246,800.0	85,876.0	28,400.0
Eastern	253,000.0	190,550.0	95,900.0	249,200.0	190,529.0	94,900.0	3,800.0	21.0	1,000.0
Summary	1,300,600.0	1,335,854.0	345,400.0	1,050,000.0	1,249,957.0	316,000.0	250,600.0	85,897.0	29,400.0
Total	2,686,014.0	3,318,594.0	942,224.0	2,224,500.0	3,209,144.0	865,439.0	461,514.0	109,450.0	76,785.0
Pacific Southwest:									
California	791,300.0	832,899.0	143,000.0	713,200.0	818,402.0	137,700.0	78,100.0	14,497.0	5,300.0
Hawaii	1,037.0	2,308.0	1,492.0	.0	.0	.0	1,037.0	2,308.0	1,492.0
Total	792,337.0	835,207.0	144,492.0	713,200.0	818,402.0	137,700.0	79,137.0	16,805.0	6,792.0
Total, Pacific Coast	3,478,351.0	4,153,801.0	1,086,716.0	2,937,700.0	4,027,546.0	1,003,139.0	540,651.0	126,255.0	83,577.0
Northern Rocky Mtn.:									
Idaho	675,899.0	394,804.0	123,365.0	669,563.0	394,780.0	121,956.0	6,336.0	24.0	1,409.0
Montana	478,034.0	234,802.0	130,063.0	473,246.0	234,792.0	128,314.0	4,788.0	10.0	1,749.0
South Dakota (West)	39,959.0	20,410.0	3,791.0	38,704.0	20,410.0	3,782.0	1,255.0	.0	9.0
Wyoming	86,377.0	19,384.0	42,055.0	82,866.0	19,325.0	40,860.0	3,511.0	59.0	1,195.0
Total	1,280,269.0	669,400.0	299,274.0	1,264,379.0	669,307.0	294,912.0	15,890.0	93.0	4,362.0
Southern Rocky Mtn.:									
Arizona	72,229.0	83,352.0	15,133.0	67,302.0	83,241.0	14,136.0	4,927.0	111.0	997.0
Colorado	209,101.0	38,670.0	91,943.0	151,741.0	36,400.0	77,873.0	57,360.0	2,270.0	14,070.0
Nevada	2,419.0	75.0	1,727.0	2,171.0	75.0	1,692.0	248.0	.0	35.0
New Mexico	78,811.0	41,122.0	36,127.0	67,480.0	40,867.0	31,438.0	11,331.0	255.0	4,689.0
Utah	46,724.0	12,532.0	53,526.0	36,127.0	12,207.0	38,510.0	10,597.0	325.0	15,016.0
Total	409,284.0	175,751.0	198,456.0	324,821.0	172,790.0	163,649.0	84,463.0	2,961.0	34,807.0
Total, Rocky Mtn	1,689,553.0	845,151.0	497,730.0	1,589,200.0	842,097.0	458,561.0	100,353.0	3,054.0	39,169.0
Total, all regions	21,664,316.0	14,229,023.0	3,924,897.0	12,284,741.0	10,046,120.0	2,302,574.0	9,379,575.0	4,182,903.0	1,622,323.0

Table 3.46—*Net annual growth, removals, and mortality of sawtimber on commercial timberland in the United States, by softwoods and hardwoods, and section, region, and State, 1976*

[Thousand board feet, International 1/4-inch rule]

Section, region and State	All species			Softwoods			Hardwoods		
	Growth	Removals	Mortality	Growth	Removals	Mortality	Growth	Removals	Mortality
New England:									
Connecticut	244,349.0	23,147.0	17,677.0	55,129.0	6,223.0	3,660.0	189,220.0	16,924.0	14,017.0
Maine	1,275,168.0	1,444,444.0	185,436.0	999,387.0	1,012,332.0	139,811.0	275,781.0	432,112.0	45,625.0
Massachusetts	364,132.0	95,751.0	20,667.0	184,371.0	57,773.0	12,780.0	179,761.0	37,978.0	7,887.0
New Hampshire	568,703.0	248,911.0	24,128.0	375,105.0	159,079.0	15,431.0	193,598.0	89,832.0	8,697.0
Rhode Island	39,428.0	6,743.0	815.0	22,106.0	1,044.0	27.0	17,322.0	5,699.0	788.0
Vermont	281,421.0	242,345.0	61,410.0	138,968.0	118,657.0	32,943.0	142,453.0	123,688.0	28,467.0
Total	2,773,201.0	2,061,341.0	310,133.0	1,775,066.0	1,355,108.0	204,652.0	998,135.0	706,233.0	105,481.0
Middle Atlantic:									
Delaware	46,962.0	28,865.0	3,682.0	11,592.0	16,400.0	1,318.0	35,370.0	12,465.0	2,364.0
Maryland	298,000.0	190,186.0	25,000.0	75,000.0	52,304.0	7,000.0	223,000.0	137,882.0	18,000.0
New Jersey	47,187.0	20,372.0	25,581.0	13,987.0	7,310.0	1,563.0	33,200.0	13,062.0	24,018.0
New York	733,215.0	570,999.0	154,057.0	226,040.0	117,648.0	50,782.0	507,175.0	453,351.0	103,275.0
Pennsylvania	1,443,542.0	708,482.0	81,637.0	103,661.0	44,955.0	8,686.0	1,339,881.0	663,527.0	72,951.0
West Virginia	1,020,005.0	434,767.0	127,304.0	192,519.0	28,312.0	21,144.0	827,486.0	406,455.0	106,160.0
Total	3,588,911.0	1,953,671.0	417,261.0	622,799.0	266,929.0	90,493.0	2,966,112.0	1,686,742.0	326,768.0
Lake States:									
Michigan	1,802,229.0	840,000.0	584,885.0	616,632.0	236,000.0	177,698.0	1,185,597.0	604,000.0	407,187.0
Minnesota	1,099,751.0	460,307.0	261,886.0	368,605.0	169,942.0	49,354.0	731,146.0	290,365.0	212,532.0
North Dakota	13,518.0	9,008.0	15,312.0	.0	8.0	.0	13,518.0	9,000.0	15,312.0
South Dakota (East)	21,539.0	4,000.0	3,656.0	3,827.0	1,000.0	33.0	17,712.0	3,000.0	3,623.0
Wisconsin	1,682,981.0	730,700.0	145,682.0	483,691.0	121,500.0	43,157.0	1,199,290.0	609,200.0	102,525.0
Total	4,620,018.0	2,044,015.0	1,011,421.0	1,472,755.0	528,450.0	270,242.0	3,147,263.0	1,515,565.0	741,179.0
Central:									
Illinois	289,994.0	342,000.0	62,652.0	2,959.0	1,000.0	13.0	287,035.0	341,000.0	62,639.0
Indiana	313,436.0	242,000.0	26,640.0	16,062.0	6,000.0	347.0	297,374.0	236,000.0	26,293.0
Iowa	101,225.0	123,300.0	25,869.0	898.0	300.0	76.0	100,327.0	123,000.0	25,793.0
Kansas	58,186.0	42,000.0	53,763.0	68.0	.0	2.0	58,118.0	42,000.0	53,761.0
Kentucky	1,086,930.0	625,589.0	74,965.0	98,686.0	35,782.0	10,255.0	988,244.0	589,807.0	64,710.0
Missouri	490,907.0	431,000.0	14,910.0	49,784.0	25,000.0	678.0	441,123.0	406,000.0	14,232.0
Nebraska	69,641.0	38,000.0	5,455.0	19,179.0	2,000.0	569.0	50,462.0	36,000.0	4,886.0
Ohio	494,221.0	510,327.0	82,726.0	18,827.0	2,436.0	4,982.0	475,394.0	507,891.0	77,744.0
Total	2,904,540.0	2,354,216.0	346,980.0	206,463.0	72,518.0	16,922.0	2,698,077.0	2,281,698.0	330,058.0
Total, North	13,886,670.0	8,413,243.0	2,085,795.0	4,077,083.0	2,223,005.0	582,309.0	9,809,587.0	6,190,238.0	1,503,486.0
South Atlantic:									
North Carolina	4,223,805.0	2,406,043.0	330,165.0	2,185,990.0	1,580,471.0	150,556.0	2,037,815.0	825,572.0	179,609.0
South Carolina	2,413,849.0	1,684,759.0	206,842.0	1,607,318.0	1,268,999.0	90,148.0	806,531.0	415,760.0	116,694.0
Virginia	2,788,806.0	1,680,482.0	270,051.0	826,419.0	714,508.0	135,774.0	1,962,387.0	965,974.0	134,277.0
Total	9,426,460.0	5,771,284.0	807,058.0	4,619,727.0	3,563,978.0	376,478.0	4,806,733.0	2,207,306.0	430,580.0
East Gulf:									
Florida	1,729,524.0	1,083,883.0	206,729.0	1,353,308.0	932,615.0	88,163.0	376,216.0	151,268.0	118,566.0
Georgia	5,804,504.0	3,796,197.0	429,344.0	4,521,709.0	2,901,677.0	228,255.0	1,282,795.0	894,520.0	201,089.0
Total	7,534,028.0	4,880,080.0	636,073.0	5,875,017.0	3,834,292.0	316,418.0	1,659,011.0	1,045,788.0	319,655.0
Central Gulf:									
Alabama	4,583,967.0	3,547,950.0	261,064.0	3,524,716.0	2,702,491.0	138,413.0	1,059,251.0	845,459.0	122,651.0
Mississippi	4,295,000.0	3,378,700.0	378,400.0	2,705,600.0	2,342,600.0	172,400.0	1,589,400.0	1,036,100.0	206,000.0
Tennessee	1,668,430.0	790,857.0	114,350.0	376,082.0	125,521.0	21,840.0	1,292,348.0	665,336.0	92,510.0
Total	10,547,397.0	7,717,507.0	753,814.0	6,606,398.0	5,170,612.0	332,653.0	3,940,999.0	2,546,895.0	421,161.0
West Gulf:									
Arkansas	2,755,519.0	2,583,305.0	178,192.0	1,778,009.0	1,812,510.0	55,634.0	977,510.0	770,795.0	122,558.0
Louisiana	3,749,472.0	3,002,295.0	349,360.0	2,713,227.0	2,274,085.0	117,089.0	1,036,245.0	728,210.0	232,271.0
Oklahoma	397,200.0	358,503.0	26,300.0	242,200.0	284,540.0	5,600.0	155,000.0	73,963.0	20,700.0
Texas	3,053,063.0	2,323,831.0	176,442.0	2,332,572.0	1,998,444.0	107,680.0	720,491.0	325,387.0	68,762.0
Total	9,955,254.0	8,267,934.0	730,294.0	7,066,008.0	6,369,579.0	286,003.0	2,889,246.0	1,898,355.0	444,291.0
Total, South	37,463,139.0	26,636,805.0	2,927,239.0	24,167,150.0	18,938,461.0	1,311,552.0	13,295,989.0	7,698,344.0	1,615,687.0

Table 3.46—*Net annual growth, removals, and mortality of sawtimber on commercial timberland in the United States, by softwoods and hardwoods, and section, region, and State, 1976—Cont'd.*

[Thousand board feet, International 1/4-inch rule]

Section, region and State	All species Growth	All species Removals	All species Mortality	Softwoods Growth	Softwoods Removals	Softwoods Mortality	Hardwoods Growth	Hardwoods Removals	Hardwoods Mortality
Pacific Northwest:									
Alaska:									
Coastal	111,086.0	663,749.0	756,793.0	111,000.0	663,611.0	748,000.0	86.0	138.0	8,793.0
Interior	364,070.0	27,735.0	32,850.0	246,280.0	9,165.0	30,640.0	117,790.0	18,570.0	2,210.0
Summary	475,156.0	691,484.0	789,643.0	357,280.0	672,776.0	778,640.0	117,876.0	18,708.0	11,003.0
Oregon:									
Western	4,584,300.0	9,013,666.0	1,443,800.0	4,081,300.0	8,946,290.0	1,318,800.0	503,000.0	67,376.0	125,000.0
Eastern	1,491,600.0	2,485,169.0	520,900.0	1,490,900.0	2,485,141.0	520,600.0	700.0	28.0	300.0
Summary	6,075,900.0	11,498,835.0	1,964,700.0	5,572,200.0	11,431,431.0	1,839,400.0	503,700.0	67,404.0	125,300.0
Washington:									
Western	5,019,200.0	6,910,427.0	1,285,400.0	4,219,700.0	6,617,913.0	1,219,700.0	799,500.0	292,514.0	65,700.0
Eastern	1,084,700.0	1,063,697.0	410,800.0	1,075,600.0	1,063,618.0	410,100.0	9,100.0	79.0	700.0
Summary	6,103,900.0	7,974,124.0	1,696,200.0	5,295,300.0	7,681,531.0	1,629,800.0	808,600.0	292,593.0	66,400.0
Total	12,654,956.0	20,164,443.0	4,450,543.0	11,224,780.0	19,785,738.0	4,247,840.0	1,430,176.0	378,705.0	202,703.0
Pacific Southwest:									
California	4,021,400.0	5,103,616.0	791,200.0	3,885,300.0	5,072,404.0	776,500.0	136,100.0	31,212.0	14,700.0
Hawaii	1,833.0	16,153.0	10 488.0	.0	.0	.0	1,833.0	16,153.0	10,488.0
Total	4,023,233.0	5,119,769.0	801,688.0	3,885,300.0	5,072,404.0	776,500.0	137,933.0	47,365.0	25,188.0
Total, Pacific Coast	16,678,189.0	25,284,212.0	5,252,231.0	15,110,080.0	24,858,142.0	5,024,340.0	1,568,109.0	426,070.0	227,891.0
Northern Rocky Mtn.:									
Idaho	2,943,711.0	2,315,747.0	561,172.0	2,931,757.0	2,315,605.0	557,538.0	11,954.0	142.0	3,634.0
Montana	1,412,980.0	1,308,644.0	460,066.0	1,398,405.0	1,308,591.0	454,066.0	14,575.0	53.0	6,000.0
South Dakota (West)	168,881.0	117,173.0	16,645.0	167,618.0	117,173.0	16,619.0	1,263.0	.0	26.0
Wyoming	356,761.0	104,983.0	152,608.0	347,492.0	104,628.0	150,551.0	9,269.0	355.0	2,057.0
Total	4,882,333.0	3,846,547.0	1,190,491.0	4,845,272.0	3,845,997.0	1,178,774.0	37,061.0	550.0	11,717.0
Southern Rocky Mtn.:									
Arizona	314,790.0	462,158.0	68,265.0	296,793.0	461,898.0	65,126.0	17,997.0	260.0	3,139.0
Colorado	958,524.0	219,904.0	328,536.0	797,944.0	207,943.0	306,298.0	160,580.0	11,961.0	22,238.0
Nevada	10,475.0	421.0	9,419.0	10,144.0	421.0	9,324.0	331.0	.0	95.0
New Mexico	266,783.0	243,878.0	134,727.0	238,996.0	242,387.0	122,706.0	27,787.0	1,491.0	12,021.0
Utah	159,929.0	69,450.0	191,387.0	148,208.0	69,015.0	164,410.0	11,721.0	435.0	26,977.0
Total	1,710,501.0	995,811.0	732,334.0	1,492,085.0	981,664.0	667,864.0	218,416.0	14,147.0	64,470.0
Total, Rocky Mtn	6,592,834.0	4,842,358.0	1,922,825.0	6,337,357.0	4,827,661.0	1,846,638.0	255,477.0	14,697.0	76,187.0
Total, all regions	74,620,832.0	65,176,618.0	12,188,090.0	49,691,670.0	50,847,269.0	8,764,839.0	24,929,162.0	14,329,349.0	3,423,251.0

Table 3.47—*Output of timber products and timber removals for the New England region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	1,131,405.0	193,186.0	175,753.0	1,260.0	434.0	15,739.0	795,338.0
Do	Hardwoods	.....do	275,927.0	44,886.0	41,919.0	349.0	85.0	2,533.0	205,032.0
Total		.....do	1,407,332.0	238,072.0	217,672.0	1,609.0	519.0	18,272.0	1,000,370.0
Veneer logs and bolts	Softwoods	.....do	131.0	14.0	14.0	.0	.0	.0	75.0
Do	Hardwoods	.....do	53,816.0	9,407.0	9,017.0	.0	.0	390.0	45,403.0
Total		.....do	53,947.0	9,421.0	9,031.0	.0	.0	390.0	45,478.0
Pulpwood	Softwoods	Standard cords	2,046,900.0	173,986.0	135,665.0	3,412.0	2,549.0	32,360.0	424,838.0
Do	Hardwoods	.....do	1,132,400.0	96,255.0	80,492.0	3,942.0	920.0	10,901.0	253,001.0
Total		.....do	3,179,300.0	270,241.0	216,157.0	7,354.0	3,469.0	43,261.0	677,839.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	2,225.0	382.0	345.0	.0	.0	.0	1,326.0
Do	Hardwoods	.....do	125.0	17.0	16.0	.0	.0	.0	72.0
Piling	Softwoods	Thousand linear feet	105.0	63.0	57.0	.0	.0	.0	277.0
Do	Hardwoods	.....do	262.0	100.0	95.0	.0	.0	.0	419.0
Poles	Softwoods	Thousand pieces	4.0	30.0	28.0	.0	.0	.0	106.0
Do	Hardwoods	.....do	2.0	1.0	1.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	.....do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	919.0	814.0	737.0	.0	.0	.0	2,437.0
Do	Hardwoods	.....do	125.0	94.0	72.0	.0	.0	.0	179.0
Other	Softwoods	Thousand cubic feet	3,587.0	3,587.0	3,371.0	.0	.0	.0	12,239.0
Do	Hardwoods	.....do	11,991.0	11,991.0	10,745.0	.0	.0	.0	26,696.0
Summary, all miscellaneous	Softwoods		----------	4,876.0	4,538.0	49.0	50.0	239.0	16,385.0
Do	Hardwoods		----------	12,203.0	10,929.0	384.0	11.0	879.0	27,366.0
Total			----------	17,079.0	15,467.0	433.0	61.0	1,118.0	43,751.0
Fuelwood	Softwoods	Standard cords	5,337.0	427.0	297.0	17.0	90.0	23.0	436.0
Do	Hardwoods	.....do	440,214.0	35,217.0	28,642.0	2,791.0	2,244.0	1,540.0	68,931.0
Total	All species	.....do	445,551.0	35,644.0	28,939.0	2,808.0	2,334.0	1,563.0	69,367.0
Total, all products	Softwoods		----------	372,489.0	316,267.0	4,738.0	3,123.0	48,361.0	1,237,072.0
Do	Hardwoods		----------	197,968.0	170,999.0	7,466.0	3,260.0	16,243.0	599,733.0
Do	All species		----------	570,457.0	487,266.0	12,204.0	6,383.0	64,604.0	1,836,805.0
Additional removals:									
Logging residues	Softwoods		----------	----------	50,450.0	----------	----------	----------	47,596.0
Do	Hardwoods		----------	----------	35,479.0	----------	----------	----------	54,258.0
Total			----------	----------	85,929.0	----------	----------	----------	101,854.0
Other removals	Softwoods		----------	----------	28,921.0	----------	----------	----------	70,440.0
Do	Hardwoods		----------	----------	37,083.0	----------	----------	----------	52,242.0
Total			----------	----------	66,004.0	----------	----------	----------	122,682.0
Total removals	Softwoods		----------	----------	395,638.0	----------	----------	----------	1,355,108.0
Do	Hardwoods		----------	----------	243,561.0	----------	----------	----------	706,233.0
Total			----------	----------	639,199.0	----------	----------	----------	2,061,341.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.48—*Output of timber products and timber removals for the Middle Atlantic region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	211,215.0	36,367.0	34,355.0	19.0	278.0	1,715.0	129,996.0
Do	Hardwoods	do	1,528,178.0	242,895.0	234,789.0	1,614.0	1,462.0	5,030.0	1,123,325.0
Total		do	1,739,393.0	279,262.0	269,144.0	1,633.0	1,740.0	6,745.0	1,253,321.0
Veneer logs and bolts	Softwoods	do	20,520.0	3,156.0	2,947.0	.0	.0	209.0	10,959.0
Do	Hardwoods	do	44,413.0	6,586.0	6,525.0	.0	.0	61.0	35,765.0
Total		do	64,933.0	9,742.0	9,472.0	.0	.0	270.0	46,724.0
Pulpwood	Softwoods	Standard cords	478,949.0	40,711.0	35,641.0	14.0	779.0	4,277.0	80,947.0
Do	Hardwoods	do	1,175,099.0	99,883.0	91,309.0	2,108.0	1,080.0	5,386.0	252,032.0
Total		do	1,654,048.0	140,594.0	126,950.0	2,122.0	1,859.0	9,663.0	332,979.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	158.0	27.0	26.0	.0	.0	.0	89.0
Do	Hardwoods	do	8,801.0	1,243.0	1,226.0	.0	.0	.0	6,072.0
Piling	Softwoods	Thousand linear feet	3,371.0	1,503.0	1,380.0	.0	.0	.0	4,257.0
Do	Hardwoods	do	1,101.0	660.0	644.0	.0	.0	.0	1,859.0
Poles	Softwoods	Thousand pieces	73.0	603.0	595.0	.0	.0	.0	1,726.0
Do	Hardwoods	do	17.0	374.0	297.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	754.0	754.0	723.0	.0	.0	.0	1,950.0
Do	Hardwoods	do	11,067.0	11,067.0	10,776.0	.0	.0	.0	29,489.0
Posts (round and split)	Softwoods	Thousand pieces	840.0	672.0	552.0	.0	.0	.0	1,599.0
Do	Hardwoods	do	5,995.0	4,884.0	3,845.0	.0	.0	.0	10,106.0
Other	Softwoods	Thousand cubic feet	4,381.0	4,381.0	2,301.0	.0	.0	.0	6,640.0
Do	Hardwoods	do	4,620.0	4,620.0	4,273.0	.0	.0	.0	9,849.0
Summary, all miscellaneous	Softwoods		----	7,940.0	5,577.0	33.0	2,011.0	319.0	16,261.0
Do	Hardwoods		----	22,848.0	21,061.0	847.0	195.0	745.0	57,375.0
Total			----	30,788.0	26,638.0	880.0	2,206.0	1,064.0	73,636.0
Fuelwood	Softwoods	Standard cords	12,211.0	977.0	202.0	478.0	157.0	140.0	480.0
Do	Hardwoods	do	319,302.0	25,544.0	17,195.0	3,314.0	2,420.0	2,615.0	38,254.0
Total	All species	do	331,513.0	26,521.0	17,397.0	3,792.0	2,577.0	2,755.0	38,734.0
Total, all products	Softwoods		----	89,151.0	78,722.0	544.0	3,225.0	6,660.0	238,643.0
Do	Hardwoods		----	397,756.0	370,879.0	7,883.0	5,157.0	13,837.0	1,506,751.0
Do	All species		----	486,907.0	449,601.0	8,427.0	8,382.0	20,497.0	1,745,394.0
Additional removals:									
Logging residues	Softwoods		----	----	14,136.0	----	----	----	12,328.0
Do	Hardwoods		----	----	124,826.0	----	----	----	70,695.0
Total			----	----	138,962.0	----	----	----	83,023.0
Other removals	Softwoods		----	----	10,080.0	----	----	----	15,366.0
Do	Hardwoods		----	----	64,428.0	----	----	----	109,296.0
Total			----	----	74,508.0	----	----	----	124,662.0
Total removals	Softwoods		----	----	102,938.0	----	----	----	266,337.0
Do	Hardwoods		----	----	560,133.0	----	----	----	1,686,742.0
Total			----	----	663,071.0	----	----	----	1,953,079.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.49—*Output of timber products and timber removals for the Lake States region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Output of roundwood products: Growing-stock trees	Output of roundwood products: Rough and rotten trees[1]	Output of roundwood products: Salvable dead trees[1]	Output of roundwood products: Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	158,823.0	28,526.0	27,878.0	50.0	.0	598.0	151,227.0
Do	Hardwoods	do	854,500.0	148,929.0	144,252.0	2,615.0	1.0	2,061.0	743,324.0
Total		do	1,013,323.0	177,455.0	172,130.0	2,665.0	1.0	2,659.0	894,551.0
Veneer logs and bolts	Softwoods	do	402.0	63.0	58.0	5.0	.0	.0	386.0
Do	Hardwoods	do	69,566.0	10,414.0	9,851.0	553.0	.0	10.0	67,703.0
Total		do	69,968.0	10,477.0	9,909.0	558.0	.0	10.0	68,089.0
Pulpwood	Softwoods	Standard cords	1,491,813.0	117,844.0	110,722.0	1,312.0	220.0	5,590.0	233,221.0
Do	Hardwoods	do	2,784,961.0	220,006.0	195,399.0	15,794.0	2,883.0	5,930.0	332,114.0
Total		do	4,276,774.0	337,850.0	306,121.0	17,106.0	3,103.0	11,520.0	565,335.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	2,916.0	404.0	349.0	.0	.0	.0	2,612.0
Piling	Softwoods	Thousand linear feet	192.0	110.0	110.0	.0	.0	.0	521.0
Do	Hardwoods	do	93.0	71.0	71.0	.0	.0	.0	448.0
Poles	Softwoods	Thousand pieces	104.0	1,425.0	1,417.0	.0	.0	.0	4,988.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	240.0	240.0	175.0	.0	.0	.0	819.0
Do	Hardwoods	do	63.0	63.0	63.0	.0	.0	.0	406.0
Posts (round and split)	Softwoods	Thousand pieces	6,320.0	5,937.0	5,207.0	.0	.0	.0	4,391.0
Do	Hardwoods	do	1,279.0	1,262.0	797.0	.0	.0	.0	1,944.0
Other	Softwoods	Thousand cubic feet	844.0	844.0	842.0	.0	.0	.0	2,963.0
Do	Hardwoods	do	20,875.0	20,875.0	20,500.0	.0	.0	.0	101,644.0
Summary, all miscellaneous	Softwoods		---	8,556.0	7,751.0	293.0	119.0	393.0	13,682.0
Do	Hardwoods		---	22,675.0	21,780.0	468.0	51.0	376.0	107,054.0
Total			---	31,231.0	29,531.0	761.0	170.0	769.0	120,736.0
Fuelwood	Softwoods	Standard cords	30,328.0	2,052.0	820.0	158.0	98.0	976.0	1,642.0
Do	Hardwoods	do	998,820.0	69,223.0	22,947.0	4,577.0	3,851.0	37,848.0	57,833.0
Total	All species	do	1,029,148.0	71,275.0	23,767.0	4,735.0	3,949.0	38,824.0	59,475.0
Total, all products	Softwoods		---	157,041.0	147,229.0	1,818.0	437.0	7,557.0	400,158.0
Do	Hardwoods		---	471,247.0	394,229.0	24,007.0	6,786.0	46,225.0	1,308,028.0
Do	All species		---	628,288.0	541,458.0	25,825.0	7,223.0	53,782.0	1,708,186.0
Additional removals:									
Logging residues	Softwoods		---	---	3,248.0	---	---	---	3,271.0
Do	Hardwoods		---	---	29,634.0	---	---	---	56,212.0
Total			---	---	32,882.0	---	---	---	59,483.0
Other removals	Softwoods		---	---	30,830.0	---	---	---	125,021.0
Do	Hardwoods		---	---	114,219.0	---	---	---	151,329.0
Total			---	---	145,049.0	---	---	---	276,350.0
Total removals	Softwoods		---	---	181,307.0	---	---	---	528,450.0
Do	Hardwoods		---	---	538,082.0	---	---	---	1,515,569.0
Total			---	---	719,389.0	---	---	---	2,044,019.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.50—*Output of timber products and timber removals for the Central States region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	51,025.0	9,048.0	7,819.0	1.0	882.0	346.0	40,056.0
Do	Hardwoods	do	1,648,152.0	262,902.0	224,178.0	29,614.0	2,703.0	6,407.0	1,355,016.0
Total		do	1,699,177.0	271,950.0	231,997.0	29,615.0	3,585.0	6,753.0	1,395,072.0
Veneer logs and bolts	Softwoods	do	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	48,907.0	7,394.0	5,882.0	1,131.0	.0	381.0	38,462.0
Total		do	48,907.0	7,394.0	5,882.0	1,131.0	.0	381.0	38,462.0
Pulpwood	Softwoods	Standard cords	28,288.0	2,379.0	1,918.0	38.0	15.0	408.0	2,741.0
Do	Hardwoods	do	456,889.0	37,992.0	29,591.0	2,675.0	2,029.0	3,697.0	107,514.0
Total		do	485,177.0	40,371.0	31,509.0	2,713.0	2,044.0	4,105.0	110,255.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	60,827.0	9,631.0	8,937.0	.0	.0	.0	54,865.0
Piling	Softwoods	Thousand linear feet	10.0	5.0	5.0	.0	.0	.0	31.0
Do	Hardwoods	do	418.0	202.0	202.0	.0	.0	.0	1,301.0
Poles	Softwoods	Thousand pieces	108.0	357.0	357.0	.0	.0	.0	490.0
Do	Hardwoods	do	2.0	8.0	8.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	527.0	527.0	484.0	.0	.0	.0	901.0
Do	Hardwoods	do	6,300.0	6,300.0	5,852.0	.0	.0	.0	13,621.0
Posts (round and split)	Softwoods	Thousand pieces	1,961.0	2,687.0	2,276.0	.0	.0	.0	1,160.0
Do	Hardwoods	do	2,941.0	1,941.0	1,318.0	.0	.0	.0	3,832.0
Other	Softwoods	Thousand cubic feet	2,095.0	2,095.0	1,336.0	.0	.0	.0	6,649.0
Do	Hardwoods	do	23,984.0	23,984.0	12,234.0	.0	.0	.0	40,997.0
Summary, all miscellaneous	Softwoods		----------	5,671.0	4,458.0	61.0	123.0	1,029.0	9,231.0
Do	Hardwoods		----------	42,066.0	28,551.0	9,399.0	611.0	3,505.0	114,616.0
Total			----------	47,737.0	33,009.0	9,460.0	734.0	4,534.0	123,847.0
Fuelwood	Softwoods	Standard cords	2,690.0	175.0	55.0	25.0	28.0	67.0	132.0
Do	Hardwoods	do	1,269,775.0	84,512.0	29,987.0	11,182.0	11,169.0	32,174.0	70,891.0
Total	All species	do	1,272,465.0	84,687.0	30,042.0	11,207.0	11,197.0	32,241.0	71,023.0
Total, all products	Softwoods		----------	17,273.0	14,250.0	125.0	1,048.0	1,850.0	52,160.0
Do	Hardwoods		----------	434,866.0	318,189.0	54,001.0	16,512.0	46,164.0	1,686,499.0
Do	All species		----------	452,139.0	332,439.0	54,126.0	17,560.0	48,014.0	1,738,659.0
Additional removals:									
Logging residues	Softwoods		----------	----------	1,415.0	----------	----------	----------	2,022.0
Do	Hardwoods		----------	----------	69,322.0	----------	----------	----------	162,953.0
Total			----------	----------	70,737.0	----------	----------	----------	164,975.0
Other removals	Softwoods		----------	----------	9,809.0	----------	----------	----------	18,336.0
Do	Hardwoods		----------	----------	224,173.0	----------	----------	----------	432,246.0
Total			----------	----------	233,982.0	----------	----------	----------	450,582.0
Total removals	Softwoods		----------	----------	25,474.0	----------	----------	----------	72,518.0
Do	Hardwoods		----------	----------	611,684.0	----------	----------	----------	2,281,698.0
Total			----------	----------	637,158.0	----------	----------	----------	2,354,216.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.51—*Output of timber products and timber removals for the North, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	1,552,468.0	267,127.0	245,805.0	1,330.0	1,594.0	18,398.0	1,116,617.0
Do	Hardwoods	do	4,306,757.0	699,612.0	645,138.0	34,192.0	4,251.0	16,031.0	3,426,697.0
Total		do	5,859,225.0	966,739.0	890,943.0	35,522.0	5,845.0	34,429.0	4,543,314.0
Veneer logs and bolts	Softwoods	do	21,053.0	3,233.0	3,019.0	5.0	.0	209.0	11,420.0
Do	Hardwoods	do	216,702.0	33,801.0	31,275.0	1,684.0	.0	842.0	187,333.0
Total		do	237,755.0	37,034.0	34,294.0	1,689.0	.0	1,051.0	198,753.0
Pulpwood	Softwoods	Standard cords	4,045,950.0	334,920.0	283,946.0	4,776.0	3,563.0	42,635.0	741,747.0
Do	Hardwoods	do	5,549,349.0	454,136.0	396,791.0	24,519.0	6,912.0	25,914.0	944,661.0
Total		do	9,595,299.0	789,056.0	680,737.0	29,295.0	10,475.0	68,549.0	1,686,408.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	2,383.0	409.0	371.0	.0	.0	.0	1,415.0
Do	Hardwoods	do	72,669.0	11,295.0	10,528.0	.0	.0	.0	63,621.0
Piling	Softwoods	Thousand linear feet	3,678.0	1,681.0	1,552.0	.0	.0	.0	5,086.0
Do	Hardwoods	do	1,874.0	1,033.0	1,012.0	.0	.0	.0	4,027.0
Poles	Softwoods	Thousand pieces	289.0	2,415.0	2,397.0	.0	.0	.0	7,310.0
Do	Hardwoods	do	21.0	383.0	306.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	1,521.0	1,521.0	1,382.0	.0	.0	.0	3,670.0
Do	Hardwoods	do	17,430.0	17,430.0	16,691.0	.0	.0	.0	43,516.0
Posts (round and split)	Softwoods	Thousand pieces	10,040.0	10,110.0	8,772.0	.0	.0	.0	9,587.0
Do	Hardwoods	do	10,340.0	8,181.0	6,032.0	.0	.0	.0	16,061.0
Other	Softwoods	Thousand cubic feet	10,907.0	10,907.0	7,850.0	.0	.0	.0	28,491.0
Do	Hardwoods	do	61,470.0	61,470.0	47,752.0	.0	.0	.0	179,186.0
Summary, all miscellaneous	Softwoods		----------	27,043.0	22,324.0	436.0	2,303.0	1,980.0	55,559.0
Do	Hardwoods		----------	99,792.0	82,321.0	11,098.0	868.0	5,505.0	306,411.0
Total			----------	126,835.0	104,645.0	11,534.0	3,171.0	7,485.0	361,970.0
Fuelwood	Softwoods	Standard cords	50,566.0	3,631.0	1,374.0	678.0	373.0	1,206.0	2,690.0
Do	Hardwoods	do	3,028,111.0	214,496.0	98,771.0	21,864.0	19,684.0	74,177.0	235,909.0
Total	All species	do	3,078,677.0	218,127.0	100,145.0	22,542.0	20,057.0	75,383.0	238,599.0
Total, all products	Softwoods		----------	635,954.0	556,468.0	7,225.0	7,833.0	64,428.0	1,928,033.0
Do	Hardwoods		----------	1,501,837.0	1,254,296.0	93,357.0	31,715.0	122,469.0	5,101,011.0
Do	All species		----------	2,137,791.0	1,810,764.0	100,582.0	39,548.0	186,897.0	7,029,044.0
Additional removals:									
Logging residues	Softwoods		----------	----------	69,249.0	----------	----------	----------	65,217.0
Do	Hardwoods		----------	----------	259,261.0	----------	----------	----------	344,118.0
Total			----------	----------	328,510.0	----------	----------	----------	409,335.0
Other removals	Softwoods		----------	----------	79,640.0	----------	----------	----------	229,163.0
Do	Hardwoods		----------	----------	439,903.0	----------	----------	----------	745,113.0
Total			----------	----------	519,543.0	----------	----------	----------	974,276.0
Total removals	Softwoods		----------	----------	705,357.0	----------	----------	----------	2,222,413.0
Do	Hardwoods		----------	----------	1,953,460.0	----------	----------	----------	6,190,242.0
Total			----------	----------	2,658,817.0	----------	----------	----------	8,412,655.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.52—*Output of timber products and timber removals for the South Atlantic region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	2,203,809.0	373,735.0	364,536.0	2,379.0	.0	6,820.0	2,005,475.0
Do	Hardwoods	do	1,224,008.0	213,826.0	199,582.0	12,353.0	.0	1,891.0	1,183,729.0
Total		do	3,427,817.0	587,561.0	564,118.0	14,732.0	.0	8,711.0	3,189,204.0
Veneer logs and bolts	Softwoods	do	489,618.0	77,603.0	75,412.0	.0	.0	2,191.0	441,713.0
Do	Hardwoods	do	136,093.0	21,352.0	20,425.0	714.0	.0	213.0	133,970.0
Total		do	625,711.0	98,955.0	95,837.0	714.0	.0	2,404.0	575,683.0
Pulpwood	Softwoods	Standard cords	5,278,051.0	395,505.0	358,160.0	10,378.0	4,030.0	22,937.0	736,124.0
Do	Hardwoods	do	2,674,865.0	200,778.0	166,937.0	24,582.0	502.0	8,757.0	268,280.0
Total		do	7,952,916.0	596,283.0	525,097.0	34,960.0	4,532.0	31,694.0	1,004,404.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	2,955.0	465.0	465.0	.0	.0	.0	3,521.0
Piling	Softwoods	Thousand linear feet	6,162.0	2,777.0	2,716.0	.0	.0	.0	15,083.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	205.0	3,424.0	3,360.0	.0	.0	.0	17,473.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	1,565.0	785.0	421.0	.0	.0	.0	83.0
Do	Hardwoods	do	10.0	7.0	6.0	.0	.0	.0	13.0
Other	Softwoods	Thousand cubic feet	2,168.0	2,168.0	1,263.0	.0	.0	.0	4,561.0
Do	Hardwoods	do	2,834.0	2,834.0	2,646.0	.0	.0	.0	12,105.0
Summary, all miscellaneous	Softwoods		----------	9,154.0	7,760.0	78.0	698.0	618.0	37,200.0
Do	Hardwoods		----------	3,306.0	3,117.0	104.0	.0	85.0	15,639.0
Total			----------	12,460.0	10,877.0	182.0	698.0	703.0	52,839.0
Fuelwood	Softwoods	Standard cords	925,204.0	68,361.0	44,429.0	1,798.0	10,986.0	11,148.0	75,802.0
Do	Hardwoods	do	1,578,141.0	118,344.0	79,488.0	23,108.0	2,282.0	13,466.0	157,210.0
Total	All species	do	2,503,345.0	186,705.0	123,917.0	24,906.0	13,268.0	24,614.0	233,012.0
Total, all products	Softwoods		----------	924,358.0	850,297.0	14,633.0	15,714.0	43,714.0	3,296,314.0
Do	Hardwoods		----------	557,606.0	469,549.0	60,861.0	2,784.0	24,412.0	1,758,828.0
Do	All species		----------	1,481,964.0	1,319,846.0	75,494.0	18,498.0	68,126.0	5,055,142.0
Additional removals:									
Logging residues	Softwoods		----------	----------	55,336.0	----------	----------	----------	76,046.0
Do	Hardwoods		----------	----------	95,074.0	----------	----------	----------	158,094.0
Total			----------	----------	150,410.0	----------	----------	----------	234,140.0
Other removals	Softwoods		----------	----------	75,519.0	----------	----------	----------	191,618.0
Do	Hardwoods		----------	----------	118,431.0	----------	----------	----------	290,384.0
Total			----------	----------	193,950.0	----------	----------	----------	482,002.0
Total removals	Softwoods		----------	----------	981,152.0	----------	----------	----------	3,563,978.0
Do	Hardwoods		----------	----------	683,054.0	----------	----------	----------	2,207,306.0
Total			----------	----------	1,664,206.0	----------	----------	----------	5,771,284.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.53—*Output of timber products and timber removals for the East Gulf region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	1,524,470.0	293,516.0	285,542.0	2,869.0	.0	5,105.0	1,491,358.0
Do	Hardwoods	do	398,759.0	73,914.0	72,144.0	1,481.0	.0	289.0	371,780.0
Total		do	1,923,229.0	367,430.0	357,686.0	4,350.0	.0	5,394.0	1,863,138.0
Veneer logs and bolts	Softwoods	do	172,595.0	30,614.0	29,895.0	.0	.0	719.0	168,229.0
Do	Hardwoods	do	114,274.0	19,657.0	18,957.0	568.0	.0	132.0	109,068.0
Total		do	286,869.0	50,271.0	48,852.0	568.0	.0	851.0	277,297.0
Pulpwood	Softwoods	Standard cords	7,827,312.0	578,937.0	531,366.0	13,174.0	163.0	34,234.0	1,449,417.0
Do	Hardwoods	do	1,010,278.0	73,841.0	64,723.0	7,952.0	.0	1,166.0	89,142.0
Total		do	8,837,590.0	652,778.0	596,089.0	21,126.0	163.0	35,400.0	1,538,559.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	474.0	75.0	72.0	.0	.0	.0	428.0
Piling	Softwoods	Thousand linear feet	1,001.0	665.0	656.0	.0	.0	.0	3,391.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	696.0	11,643.0	11,428.0	.0	.0	.0	67,527.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	10,518.0	6,666.0	4,534.0	.0	.0	.0	1,418.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	1,102.0	1,102.0	1,044.0	.0	.0	.0	2,029.0
Do	Hardwoods	do	377.0	377.0	360.0	.0	.0	.0	1,006.0
Summary, all miscellaneous	Softwoods		----------	20,076.0	17,662.0	888.0	.0	1,526.0	74,365.0
Do	Hardwoods		----------	452.0	432.0	13.0	.0	7.0	1,434.0
Total			----------	20,528.0	18,094.0	901.0	.0	1,533.0	75,799.0
Fuelwood	Softwoods	Standard cords	72,414.0	5,250.0	4,857.0	.0	50.0	343.0	16,038.0
Do	Hardwoods	do	101,129.0	7,440.0	5,518.0	1,533.0	.0	389.0	8,704.0
Total	All species	do	173,543.0	12,690.0	10,375.0	1,533.0	50.0	732.0	24,742.0
Total, all products	Softwoods		----------	928,393.0	869,322.0	16,931.0	213.0	41,927.0	3,199,407.0
Do	Hardwoods		----------	175,304.0	161,774.0	11,547.0	.0	1,983.0	580,128.0
Do	All species		----------	1,103,697.0	1,031,096.0	28,478.0	213.0	43,910.0	3,779,535.0
Additional removals:									
Logging residues	Softwoods		----------	----------	86,061.0	----------	----------	----------	295,159.0
Do	Hardwoods		----------	----------	59,576.0	----------	----------	----------	169,646.0
Total			----------	----------	145,637.0	----------	----------	----------	464,805.0
Other removals	Softwoods		----------	----------	92,269.0	----------	----------	----------	339,726.0
Do	Hardwoods		----------	----------	98,117.0	----------	----------	----------	296,014.0
Total			----------	----------	190,386.0	----------	----------	----------	635,740.0
Total removals	Softwoods		----------	----------	1,047,652.0	----------	----------	----------	3,834,292.0
Do	Hardwoods		----------	----------	319,467.0	----------	----------	----------	1,045,788.0
Total			----------	----------	1,367,119.0	----------	----------	----------	4,880,080.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.54—*Output of timber products and timber removals for the Central Gulf region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	2,600,308.0	451,795.0	443,993.0	1,272.0	760.0	5,770.0	2,513,037.0
Do	Hardwoods	.....do	1,278,479.0	217,271.0	210,504.0	4,293.0	1,547.0	927.0	1,206,737.0
Total		.....do	3,878,787.0	669,066.0	654,497.0	5,565.0	2,307.0	6,697.0	3,719,774.0
Veneer logs and bolts	Softwoods	.....do	782,965.0	124,143.0	121,130.0	436.0	.0	2,577.0	755,499.0
Do	Hardwoods	.....do	78,396.0	13,156.0	12,929.0	172.0	.0	55.0	76,058.0
Total		.....do	861,361.0	137,299.0	134,059.0	608.0	.0	2,632.0	831,557.0
Pulpwood	Softwoods	Standard cords	6,045,805.0	489,710.0	459,786.0	3,150.0	327.0	26,447.0	1,455,111.0
Do	Hardwoods	.....do	3,042,826.0	243,426.0	214,167.0	9,946.0	407.0	18,906.0	698,858.0
Total		.....do	9,088,631.0	733,136.0	673,953.0	13,096.0	734.0	45,353.0	2,153,969.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	3,651.0	599.0	591.0	.0	.0	.0	3,195.0
Do	Hardwoods	.....do	9,214.0	1,327.0	1,309.0	.0	.0	.0	8,806.0
Piling	Softwoods	Thousand linear feet	13,326.0	9,757.0	9,715.0	.0	.0	.0	57,615.0
Do	Hardwoods	.....do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	2,405.0	31,974.0	31,737.0	.0	.0	.0	162,210.0
Do	Hardwoods	.....do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	.....do	51.0	51.0	51.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	6,062.0	3,658.0	3,323.0	.0	.0	.0	750.0
Do	Hardwoods	.....do	3,156.0	2,052.0	1,872.0	.0	.0	.0	1,579.0
Other	Softwoods	Thousand cubic feet	7,308.0	7,308.0	6,862.0	.0	.0	.0	21,217.0
Do	Hardwoods	.....do	9,450.0	9,450.0	9,015.0	.0	.0	.0	39,233.0
Summary, all miscellaneous	Softwoods		----------	53,296.0	52,228.0	49.0	6.0	1,013.0	244,987.0
Do	Hardwoods		----------	12,880.0	12,247.0	213.0	45.0	375.0	49,618.0
Total			----------	66,176.0	64,475.0	262.0	51.0	1,388.0	294,605.0
Fuelwood	Softwoods	Standard cords	21,949.0	1,647.0	1,164.0	134.0	65.0	284.0	2,234.0
Do	Hardwoods	.....do	785,030.0	58,877.0	43,195.0	3,443.0	2,590.0	9,649.0	100,698.0
Total	All species	.....do	806,979.0	60,524.0	44,359.0	3,577.0	2,655.0	9,933.0	102,932.0
Total, all products	Softwoods		----------	1,120,591.0	1,078,301.0	5,041.0	1,158.0	36,091.0	4,970,868.0
Do	Hardwoods		----------	545,610.0	493,042.0	18,067.0	4,589.0	29,912.0	2,131,969.0
Do	All species		----------	1,666,201.0	1,571,343.0	23,108.0	5,747.0	66,003.0	7,102,837.0
Additional removals:									
Logging residues	Softwoods		----------	----------	42,438.0	----------	----------	----------	137,007.0
Do	Hardwoods		----------	----------	68,229.0	----------	----------	----------	210,982.0
Total			----------	----------	110,667.0	----------	----------	----------	347,989.0
Other removals	Softwoods		----------	----------	17,738.0	----------	----------	----------	62,773.0
Do	Hardwoods		----------	----------	59,967.0	----------	----------	----------	203,908.0
Total			----------	----------	77,705.0	----------	----------	----------	266,681.0
Total removals	Softwoods		----------	----------	1,138,477.0	----------	----------	----------	5,170,648.0
Do	Hardwoods		----------	----------	621,238.0	----------	----------	----------	2,546,859.0
Total			----------	----------	1,759,715.0	----------	----------	----------	7,717,507.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.55—*Output of timber products and timber removals for the West Gulf region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Output of roundwood products: Growing-stock trees	Output of roundwood products: Rough and rotten trees[1]	Output of roundwood products: Salvable dead trees[1]	Output of roundwood products: Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	2,942,736.0	479,906.0	476,599.0	549.0	.0	2,758.0	2,920,801.0
Do	Hardwoods	do	970,895.0	162,392.0	157,397.0	3,007.0	1,664.0	324.0	938,960.0
Total		do	3,913,631.0	642,298.0	633,996.0	3,556.0	1,664.0	3,082.0	3,859,761.0
Veneer logs and bolts	Softwoods	do	1,702,588.0	265,780.0	262,346.0	1,907.0	.0	1,527.0	1,679,236.0
Do	Hardwoods	do	53,794.0	9,026.0	8,872.0	116.0	.0	38.0	52,192.0
Total		do	1,756,382.0	274,806.0	271,218.0	2,023.0	.0	1,565.0	1,731,428.0
Pulpwood	Softwoods	Standard cords	5,847,205.0	473,624.0	444,898.0	3,048.0	315.0	25,363.0	1,407,988.0
Do	Hardwoods	do	1,992,498.0	159,399.0	140,238.0	6,514.0	268.0	12,379.0	457,628.0
Total		do	7,839,703.0	633,023.0	585,136.0	9,562.0	583.0	37,742.0	1,865,616.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	2,953.0	425.0	419.0	.0	.0	.0	2,822.0
Piling	Softwoods	Thousand linear feet	9,899.0	8,458.0	8,418.0	.0	.0	.0	49,085.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	1,645.0	19,396.0	19,251.0	.0	.0	.0	98,405.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	67.0	67.0	67.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	15,754.0	9,496.0	8,629.0	.0	.0	.0	652.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	2,069.0	2,069.0	1,925.0	.0	.0	.0	4,105.0
Do	Hardwoods	do	20,531.0	20,531.0	17,284.0	.0	.0	.0	61,707.0
Summary, all miscellaneous	Softwoods		----	39,419.0	38,223.0	14.0	.0	1,182.0	152,247.0
Do	Hardwoods		----	21,023.0	17,770.0	1,310.0	527.0	1,416.0	64,529.0
Total			----	60,442.0	55,993.0	1,324.0	527.0	2,598.0	216,776.0
Fuelwood	Softwoods	Standard cords	20,343.0	1,526.0	947.0	70.0	110.0	399.0	1,784.0
Do	Hardwoods	do	815,314.0	61,148.0	40,987.0	3,923.0	3,398.0	12,840.0	47,197.0
Total	All species	do	835,657.0	62,674.0	41,934.0	3,993.0	3,508.0	13,239.0	48,981.0
Total, all products	Softwoods		----	1,260,255.0	1,223,013.0	5,588.0	425.0	31,229.0	6,162,056.0
Do	Hardwoods		----	412,988.0	365,264.0	14,870.0	5,857.0	26,997.0	1,560,506.0
Do	All species		----	1,673,243.0	1,588,277.0	20,458.0	6,282.0	58,226.0	7,722,562.0
Additional removals:									
Logging residues	Softwoods		----	----	68,444.0	----	----	----	152,580.0
Do	Hardwoods		----	----	73,031.0	----	----	----	216,041.0
Total			----	----	141,475.0	----	----	----	368,621.0
Other removals	Softwoods		----	----	12,346.0	----	----	----	54,943.0
Do	Hardwoods		----	----	38,085.0	----	----	----	121,768.0
Total			----	----	50,431.0	----	----	----	176,711.0
Total removals	Softwoods		----	----	1,303,803.0	----	----	----	6,369,579.0
Do	Hardwoods		----	----	476,380.0	----	----	----	1,898,315.0
Total			----	----	1,780,183.0	----	----	----	8,267,894.0

Table 3.56—*Output of timber products and timber removals for the South, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	9,271,323.0	1,598,952.0	1,570,670.0	7,069.0	760.0	20,453.0	8,930,671.0
Do	Hardwoods	do	3,872,141.0	667,403.0	639,627.0	21,134.0	3,211.0	3,431.0	3,701,206.0
Total		do	13,143,464.0	2,266,355.0	2,210,297.0	28,203.0	3,971.0	23,884.0	12,631,877.0
Veneer logs and bolts	Softwoods	do	3,147,766.0	498,140.0	488,783.0	2,343.0	.0	7,014.0	3,044,677.0
Do	Hardwoods	do	382,557.0	63,191.0	61,183.0	1,570.0	.0	438.0	371,288.0
Total		do	3,530,323.0	561,331.0	549,966.0	3,913.0	.0	7,452.0	3,415,965.0
Pulpwood	Softwoods	Standard cords	24,998,373.0	1,937,776.0	1,794,210.0	29,750.0	4,835.0	108,981.0	5,048,640.0
Do	Hardwoods	do	8,720,467.0	677,444.0	586,065.0	48,994.0	1,177.0	41,208.0	1,513,908.0
Total		do	33,718,840.0	2,615,220.0	2,380,275.0	78,744.0	6,012.0	150,189.0	6,562,548.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	3,651.0	599.0	591.0	.0	.0	.0	3,195.0
Do	Hardwoods	do	15,596.0	2,292.0	2,265.0	.0	.0	.0	15,577.0
Piling	Softwoods	Thousand linear feet	30,388.0	21,657.0	21,505.0	.0	.0	.0	125,174.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	4,951.0	66,437.0	65,776.0	.0	.0	.0	345,615.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	118.0	118.0	118.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	33,899.0	20,605.0	16,907.0	.0	.0	.0	2,903.0
Do	Hardwoods	do	3,166.0	2,059.0	1,878.0	.0	.0	.0	1,592.0
Other	Softwoods	Thousand cubic feet	12,647.0	12,647.0	11,094.0	.0	.0	.0	31,912.0
Do	Hardwoods	do	33,192.0	33,192.0	29,305.0	.0	.0	.0	114,051.0
Summary, all miscellaneous	Softwoods		---	121,945.0	115,873.0	1,029.0	704.0	4,339.0	508,799.0
Do	Hardwoods		---	37,661.0	33,566.0	1,640.0	572.0	1,883.0	131,220.0
Total			---	159,606.0	149,439.0	2,669.0	1,276.0	6,222.0	640,019.0
Fuelwood	Softwoods	Standard cords	1,039,910.0	76,784.0	51,397.0	2,002.0	11,211.0	12,174.0	95,858.0
Do	Hardwoods	do	3,279,614.0	245,809.0	169,188.0	32,007.0	8,270.0	36,344.0	313,809.0
Total	All species	do	4,319,524.0	322,593.0	220,585.0	34,009.0	19,481.0	48,518.0	409,667.0
Total, all products	Softwoods		---	4,233,597.0	4,020,933.0	42,193.0	17,510.0	152,961.0	17,628,645.0
Do	Hardwoods		---	1,691,508.0	1,489,629.0	105,345.0	13,230.0	83,304.0	6,031,431.0
Do	All species		---	5,925,105.0	5,510,562.0	147,538.0	30,740.0	236,265.0	23,660,076.0
Additional removals:									
Logging residues	Softwoods		---	---	252,279.0	---	---	---	660,792.0
Do	Hardwoods		---	---	295,910.0	---	---	---	754,763.0
Total			---	---	548,189.0	---	---	---	1,415,555.0
Other removals	Softwoods		---	---	197,872.0	---	---	---	649,060.0
Do	Hardwoods		---	---	314,600.0	---	---	---	912,074.0
Total			---	---	512,472.0	---	---	---	1,561,134.0
Total removals	Softwoods		---	---	4,471,084.0	---	---	---	18,938,497.0
Do	Hardwoods		---	---	2,100,139.0	---	---	---	7,698,268.0
Total			---	---	6,571,223.0	---	---	---	26,636,765.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.57—*Output of timber products and timber removals for the PNW Douglas-fir subregion, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Output of roundwood products: Growing-stock trees	Output of roundwood products: Rough and rotten trees[1]	Output of roundwood products: Salvable dead trees[1]	Output of roundwood products: Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	10,168,059.0	1,495,304.0	1,390,313.0	4,314.0	66,100.0	34,577.0	9,454,129.0
Do	Hardwoods	do	221,165.0	61,434.0	56,385.0	.0	5,037.0	12.0	202,986.0
Total		do	10,389,224.0	1,556,738.0	1,446,698.0	4,314.0	71,137.0	34,589.0	9,657,115.0
Veneer logs and bolts	Softwoods	do	4,088,613.0	572,635.0	490,196.0	4,905.0	33,066.0	44,468.0	3,499,999.0
Do	Hardwoods	do	12,265.0	3,407.0	3,226.0	.0	181.0	.0	11,614.0
Total		do	4,100,878.0	576,042.0	493,422.0	4,905.0	33,247.0	44,468.0	3,511,613.0
Pulpwood	Softwoods	Standard cords	2,963,802.0	254,887.0	204,436.0	4,078.0	6,373.0	40,000.0	1,133,151.0
Do	Hardwoods	do	215,124.0	18,500.0	17,963.0	.0	537.0	.0	73,895.0
Total		do	3,178,926.0	273,387.0	222,399.0	4,078.0	6,910.0	40,000.0	1,207,046.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	2,924.0	2,167.0	2,167.0	.0	.0	.0	10,581.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	479.0	12,608.0	12,608.0	.0	.0	.0	54,479.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	40.0	40.0	40.0	.0	.0	.0	186.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	184.0	203.0	203.0	.0	.0	.0	849.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	47,514.0	47,514.0	47,514.0	.0	.0	.0	274,325.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Summary, all miscellaneous	Softwoods		---	62,532.0	62,532.0	.0	.0	.0	340,420.0
Do	Hardwoods		---	.0	.0	.0	.0	.0	.0
Total			---	62,532.0	62,532.0	.0	.0	.0	340,420.0
Fuelwood	Softwoods	Standard cords	195,600.0	16,820.0	3,602.0	470.0	12,278.0	470.0	15,784.0
Do	Hardwoods	do	5,600.0	480.0	88.0	.0	.0	392.0	380.0
Total	All species	do	201,200.0	17,300.0	3,690.0	470.0	12,278.0	862.0	16,164.0
Total, all products	Softwoods		---	2,402,178.0	2,151,079.0	13,767.0	117,817.0	119,515.0	14,443,483.0
Do	Hardwoods		---	83,821.0	77,662.0	.0	5,755.0	404.0	288,875.0
Do	All species		---	2,485,999.0	2,228,741.0	13,767.0	123,572.0	119,919.0	14,732,358.0
Additional removals:									
Logging residues	Softwoods		---	---	276,105.0	---	---	---	889,060.0
Do	Hardwoods		---	---	22,210.0	---	---	---	49,750.0
Total			---	---	298,315.0	---	---	---	938,810.0
Other removals	Softwoods		---	---	39,465.0	---	---	---	231,660.0
Do	Hardwoods		---	---	6,385.0	---	---	---	21,265.0
Total			---	---	45,850.0	---	---	---	252,925.0
Total removals	Softwoods		---	---	2,466,649.0	---	---	---	15,564,203.0
Do	Hardwoods		---	---	106,257.0	---	---	---	359,890.0
Total			---	---	2,572,906.0	---	---	---	15,924,093.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.58—*Output of timber products and timber removals for the PNW Pine subregion, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Output of roundwood products: Growing-stock trees	Output of roundwood products: Rough and rotten trees[1]	Output of roundwood products: Salvable dead trees[1]	Output of roundwood products: Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	2,633,435.0	463,632.0	451,249.0	330.0	9,272.0	2,781.0	2,563,094.0
Do	Hardwoods	do	64.0	15.0	14.0	.0	1.0	.0	62.0
Total		do	2,633,499.0	463,647.0	451,263.0	330.0	9,273.0	2,781.0	2,563,156.0
Veneer logs and bolts	Softwoods	do	674,531.0	112,610.0	110,984.0	.0	1,237.0	389.0	664,794.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total		do	674,531.0	112,610.0	110,984.0	.0	1,237.0	389.0	664,794.0
Pulpwood	Softwoods	Standard cords	32,468.0	2,792.0	2,597.0	55.0	140.0	.0	11,670.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total		do	32,468.0	2,792.0	2,597.0	55.0	140.0	.0	11,670.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	16.0	12.0	12.0	.0	.0	.0	58.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	28.0	763.0	763.0	.0	.0	.0	3,746.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	110.0	110.0	110.0	.0	.0	.0	492.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	322.0	353.0	353.0	.0	.0	.0	2,048.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	4,339.0	4,339.0	4,339.0	.0	.0	.0	19,526.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Summary, all miscellaneous	Softwoods		----------	5,577.0	5,577.0	.0	.0	.0	25,870.0
Do	Hardwoods		----------	.0	.0	.0	.0	.0	.0
Total			----------	5,577.0	5,577.0	.0	.0	.0	25,870.0
Fuelwood	Softwoods	Standard cords	93,716.0	8,060.0	1,976.0	1,474.0	4,610.0	.0	9,756.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total	All species	do	93,716.0	8,060.0	1,976.0	1,474.0	4,610.0	.0	9,756.0
Total, all products	Softwoods		----------	592,671.0	572,383.0	1,859.0	15,259.0	3,170.0	3,275,184.0
Do	Hardwoods		----------	15.0	14.0	.0	1.0	.0	62.0
Do	All species		----------	592,686.0	572,397.0	1,859.0	15,260.0	3,170.0	3,275,246.0
Additional removals:									
Logging residues	Softwoods		----------	----------	36,465.0	----------	----------	----------	109,760.0
Do	Hardwoods		----------	----------	15.0	----------	----------	----------	45.0
Total			----------	----------	36,480.0	----------	----------	----------	109,805.0
Other removals	Softwoods		----------	----------	26,210.0	----------	----------	----------	163,815.0
Do	Hardwoods		----------	----------	.0	----------	----------	----------	.0
Total			----------	----------	26,210.0	----------	----------	----------	163,815.0
Total removals	Softwoods		----------	----------	635,058.0	----------	----------	----------	3,548,759.0
Do	Hardwoods		----------	----------	29.0	----------	----------	----------	107.0
Total			----------	----------	635,087.0	----------	----------	----------	3,548,866.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.59—*Output of timber products and timber removals for Coastal Alaska, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	395,550.0	62,427.0	61,043.0	530.0	854.0	.0	386,786.0
Do	Hardwoods	do	138.0	22.0	22.0	.0	.0	.0	138.0
Total		do	395,688.0	62,449.0	61,065.0	530.0	854.0	.0	386,924.0
Veneer logs and bolts	Softwoods	do	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total		do	.0	.0	.0	.0	.0	.0	.0
Pulpwood	Softwoods	Standard cords	515,467.0	46,392.0	40,200.0	4,742.0	1,450.0	.0	254,720.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total		do	515,467.0	46,392.0	40,200.0	4,742.0	1,450.0	.0	254,720.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Summary, all miscellaneous	Softwoods		----------	.0	.0	.0	.0	.0	.0
Do	Hardwoods		----------	.0	.0	.0	.0	.0	.0
Total			----------	.0	.0	.0	.0	.0	.0
Fuelwood	Softwoods	Standard cords	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total	All species	do	.0	.0	.0	.0	.0	.0	.0
Total, all products	Softwoods		----------	108,819.0	101,243.0	5,272.0	2,304.0	.0	641,506.0
Do	Hardwoods		----------	22.0	22.0	.0	.0	.0	138.0
Do	All species		----------	108,841.0	101,265.0	5,272.0	2,304.0	.0	641,644.0
Additional removals:									
Logging residues	Softwoods		----------	----------	4,643.0	----------	----------	----------	22,105.0
Do	Hardwoods		----------	----------	.0	----------	----------	----------	.0
Total			----------	----------	4,643.0	----------	----------	----------	22,105.0
Other removals	Softwoods		----------	----------	.0	----------	----------	----------	.0
Do	Hardwoods		----------	----------	.0	----------	----------	----------	.0
Total			----------	----------	.0	----------	----------	----------	.0
Total removals	Softwoods		----------	----------	105,886.0	----------	----------	----------	663,611.0
Do	Hardwoods		----------	----------	22.0	----------	----------	----------	138.0
Total			----------	----------	105,908.0	----------	----------	----------	663,749.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.60—*Output of timber products and timber removals for Interior Alaska, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	2,315.0	392.0	392.0	.0	.0	.0	2,315.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total		do	2,315.0	392.0	392.0	.0	.0	.0	2,315.0
Veneer logs and bolts	Softwoods	do	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total		do	.0	.0	.0	.0	.0	.0	.0
Pulpwood	Softwoods	Standard cords	70,652.0	5,793.0	1,159.0	.0	4,634.0	.0	6,850.0
Do	Hardwoods	do	37,000.0	3,034.0	3,034.0	.0	.0	.0	17,932.0
Total		do	107,652.0	8,827.0	4,193.0	.0	4,634.0	.0	24,782.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Summary, all miscellaneous	Softwoods		--------	.0	.0	.0	.0	.0	.0
Do	Hardwoods		--------	.0	.0	.0	.0	.0	.0
Total			--------	.0	.0	.0	.0	.0	.0
Fuelwood	Softwoods	Standard cords	243.0	243.0	.0	.0	.0	243.0	.0
Do	Hardwoods	do	108.0	108.0	108.0	.0	.0	.0	638.0
Total	All species	do	351.0	351.0	108.0	.0	.0	243.0	638.0
Total, all products	Softwoods		--------	6,428.0	1,551.0	.0	4,634.0	243.0	9,165.0
Do	Hardwoods		--------	3,142.0	3,142.0	.0	.0	.0	18,570.0
Do	All species		--------	9,570.0	4,693.0	.0	4,634.0	243.0	27,735.0
Additional removals:									
Logging residues	Softwoods		--------	--------	.0	--------	--------	--------	.0
Do	Hardwoods		--------	--------	.0	--------	--------	--------	.0
Total			--------	--------	.0	--------	--------	--------	.0
Other removals	Softwoods		--------	--------	.0	--------	--------	--------	.0
Do	Hardwoods		--------	--------	.0	--------	--------	--------	.0
Total			--------	--------	.0	--------	--------	--------	.0
Total removals	Softwoods		--------	--------	1,551.0	--------	--------	--------	9,165.0
Do	Hardwoods		--------	--------	3,142.0	--------	--------	--------	18,570.0
Total			--------	--------	4,693.0	--------	--------	--------	27,735.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.61—*Output of timber products and timber removals for the Pacific Northwest region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Output of roundwood products						
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	13,199,359.0	2,021,755.0	1,902,997.0	5,174.0	76,226.0	37,358.0	12,406,324.0
Do	Hardwoods	do	221,367.0	61,471.0	56,421.0	.0	5,038.0	12.0	203,186.0
Total		do	13,420,726.0	2,083,226.0	1,959,418.0	5,174.0	81,264.0	37,370.0	12,609,510.0
Veneer logs and bolts	Softwoods	do	4,763,144.0	685,245.0	601,180.0	4,905.0	34,303.0	44,857.0	4,164,793.0
Do	Hardwoods	do	12,265.0	3,407.0	3,226.0	.0	181.0	.0	11,614.0
Total		do	4,775,409.0	688,652.0	604,406.0	4,905.0	34,484.0	44,857.0	4,176,407.0
Pulpwood	Softwoods	Standard cords	3,582,389.0	309,864.0	248,392.0	8,875.0	12,597.0	40,000.0	1,406,391.0
Do	Hardwoods	do	252,124.0	21,534.0	20,997.0	.0	537.0	.0	91,827.0
Total		do	3,834,513.0	331,398.0	269,389.0	8,875.0	13,134.0	40,000.0	1,498,218.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	2,940.0	2,179.0	2,179.0	.0	.0	.0	10,639.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	507.0	13,371.0	13,371.0	.0	.0	.0	58,225.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	150.0	150.0	150.0	.0	.0	.0	678.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	506.0	556.0	556.0	.0	.0	.0	2,897.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	51,853.0	51,853.0	51,853.0	.0	.0	.0	293,851.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Summary, all miscellaneous	Softwoods		---	68,109.0	68,109.0	.0	.0	.0	366,290.0
Do	Hardwoods		---	.0	.0	.0	.0	.0	.0
Total			---	68,109.0	68,109.0	.0	.0	.0	366,290.0
Fuelwood	Softwoods	Standard cords	289,559.0	25,123.0	5,578.0	1,944.0	16,888.0	713.0	25,540.0
Do	Hardwoods	do	5,708.0	588.0	196.0	.0	.0	392.0	1,018.0
Total	All species	do	295,267.0	25,711.0	5,774.0	1,944.0	16,888.0	1,105.0	26,558.0
Total, all products	Softwoods		---	3,110,096.0	2,826,256.0	20,898.0	140,014.0	122,928.0	18,369,338.0
Do	Hardwoods		---	87,000.0	80,840.0	.0	5,756.0	404.0	307,645.0
Do	All species		---	3,197,096.0	2,907,096.0	20,898.0	145,770.0	123,332.0	18,676,983.0
Additional removals:									
Logging residues	Softwoods		---	---	317,213.0	---	---	---	1,020,925.0
Do	Hardwoods		---	---	22,225.0	---	---	---	49,795.0
Total			---	---	339,438.0	---	---	---	1,070,720.0
Other removals	Softwoods		---	---	65,675.0	---	---	---	395,475.0
Do	Hardwoods		---	---	6,385.0	---	---	---	21,265.0
Total			---	---	72,060.0	---	---	---	416,740.0
Total removals	Softwoods		---	---	3,209,144.0	---	---	---	19,785,738.0
Do	Hardwoods		---	---	109,450.0	---	---	---	378,705.0
Total			---	---	3,318,594.0	---	---	---	20,164,443.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.62—*Output of timber products and timber removals for the Pacific Southwest region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	4,422,482.0	681,430.0	637,106.0	.0	23,713.0	20,611.0	4,134,820.0
Do	Hardwoods	do	11,837.0	2,923.0	2,923.0	.0	.0	.0	11,837.0
Total		do	4,434,319.0	684,353.0	640,029.0	.0	23,713.0	20,611.0	4,146,657.0
Veneer logs and bolts	Softwoods	do	576,383.0	78,420.0	69,318.0	.0	2,703.0	6,399.0	509,487.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total		do	576,383.0	78,420.0	69,318.0	.0	2,703.0	6,399.0	509,487.0
Pulpwood	Softwoods	Standard cords	5,400.0	464.0	464.0	.0	.0	.0	2,700.0
Do	Hardwoods	do	24,000.0	2,064.0	1,921.0	143.0	.0	.0	13,447.0
Total		do	29,400.0	2,528.0	2,385.0	143.0	.0	.0	16,147.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	364.0	331.0	331.0	.0	.0	.0	1,655.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	62.0	1,740.0	1,740.0	.0	.0	.0	6,203.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	267.0	267.0	267.0	.0	.0	.0	953.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	89.0	116.0	116.0	.0	.0	.0	413.0
Do	Hardwoods	do	10.0	28.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	628.0	628.0	628.0	.0	.0	.0	4,751.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Summary, all miscellaneous	Softwoods		-----	3,082.0	3,082.0	.0	.0	.0	13,975.0
Do	Hardwoods		-----	28.0	.0	.0	.0	28.0	.0
Total			-----	3,110.0	3,082.0	.0	.0	28.0	13,975.0
Fuelwood	Softwoods	Standard cords	25,275.0	2,174.0	272.0	1,565.0	293.0	44.0	1,454.0
Do	Hardwoods	do	96,164.0	8,267.0	3,336.0	453.0	3,691.0	787.0	11,921.0
Total	All species	do	121,439.0	10,441.0	3,608.0	2,018.0	3,984.0	831.0	13,375.0
Total, all products	Softwoods		-----	765,570.0	710,242.0	1,565.0	26,709.0	27,054.0	4,662,436.0
Do	Hardwoods		-----	13,282.0	8,180.0	596.0	3,691.0	815.0	37,205.0
Do	All species		-----	778,852.0	718,422.0	2,161.0	30,400.0	27,869.0	4,699,641.0
Additional removals:									
Logging residues	Softwoods		-----	-----	82,710.0	-----	-----	-----	253,462.0
Do	Hardwoods		-----	-----	7,610.0	-----	-----	-----	6,545.0
Total			-----	-----	90,320.0	-----	-----	-----	260,007.0
Other removals	Softwoods		-----	-----	25,450.0	-----	-----	-----	156,506.0
Do	Hardwoods		-----	-----	1,015.0	-----	-----	-----	3,615.0
Total			-----	-----	26,465.0	-----	-----	-----	160,121.0
Total removals	Softwoods		-----	-----	818,402.0	-----	-----	-----	5,072,404.0
Do	Hardwoods		-----	-----	16,805.0	-----	-----	-----	47,365.0
Total			-----	-----	835,207.0	-----	-----	-----	5,119,769.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.63—*Output of timber products and timber removals for the Pacific Coast, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	17,621,841.0	2,703,185.0	2,540,103.0	5,174.0	99,939.0	57,969.0	16,541,144.0
Do	Hardwoods	.....do	233,204.0	64,394.0	59,344.0	.0	5,038.0	12.0	215,023.0
Total		.....do	17,855,045.0	2,767,579.0	2,599,447.0	5,174.0	104,977.0	57,981.0	16,756,167.0
Veneer logs and bolts	Softwoods	.....do	5,339,527.0	763,665.0	670,498.0	4,905.0	37,006.0	51,256.0	4,674,280.0
Do	Hardwoods	.....do	12,265.0	3,407.0	3,226.0	.0	181.0	.0	11,614.0
Total		.....do	5,351,792.0	767,072.0	673,724.0	4,905.0	37,187.0	51,256.0	4,685,894.0
Pulpwood	Softwoods	Standard cords	3,587,789.0	310,328.0	248,856.0	8,875.0	12,597.0	40,000.0	1,409,091.0
Do	Hardwoods	.....do	276,124.0	23,598.0	22,918.0	143.0	537.0	.0	105,274.0
Total		.....do	3,863,913.0	333,926.0	271,774.0	9,018.0	13,134.0	40,000.0	1,514,365.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	.....do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	3,304.0	2,510.0	2,510.0	.0	.0	.0	12,294.0
Do	Hardwoods	.....do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	569.0	15,111.0	15,111.0	.0	.0	.0	64,428.0
Do	Hardwoods	.....do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	417.0	417.0	417.0	.0	.0	.0	1,631.0
Do	Hardwoods	.....do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	595.0	672.0	672.0	.0	.0	.0	3,310.0
Do	Hardwoods	.....do	10.0	28.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	52,481.0	52,481.0	52,481.0	.0	.0	.0	298,602.0
Do	Hardwoods	.....do	.0	.0	.0	.0	.0	.0	.0
Summary, all miscellaneous	Softwoods		---	71,191.0	71,191.0	.0	.0	.0	380,265.0
Do	Hardwoods		---	28.0	.0	.0	.0	28.0	.0
Total			---	71,219.0	71,191.0	.0	.0	28.0	380,265.0
Fuelwood	Softwoods	Standard cords	314,834.0	27,297.0	5,850.0	3,509.0	17,181.0	757.0	26,994.0
Do	Hardwoods	.....do	101,872.0	8,855.0	3,532.0	453.0	3,691.0	1,179.0	12,939.0
Total	All species	.....do	416,706.0	36,152.0	9,382.0	3,962.0	20,872.0	1,936.0	39,933.0
Total, all products	Softwoods		---	3,875,666.0	3,536,498.0	22,463.0	166,723.0	149,982.0	23,031,774.0
Do	Hardwoods		---	100,282.0	89,020.0	596.0	9,447.0	1,219.0	344,850.0
Do	All species		---	3,975,948.0	3,625,518.0	23,059.0	176,170.0	151,201.0	23,376,624.0
Additional removals:									
Logging residues	Softwoods		---	---	399,923.0	---	---	---	1,274,387.0
Do	Hardwoods		---	---	29,835.0	---	---	---	56,340.0
Total			---	---	429,758.0	---	---	---	1,330,727.0
Other removals	Softwoods		---	---	91,125.0	---	---	---	551,981.0
Do	Hardwoods		---	---	7,400.0	---	---	---	24,880.0
Total			---	---	98,525.0	---	---	---	576,861.0
Total removals	Softwoods		---	---	4,027,546.0	---	---	---	24,858,142.0
Do	Hardwoods		---	---	126,255.0	---	---	---	426,070.0
Total			---	---	4,153,801.0	---	---	---	25,284,212.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.64—*Output of timber products and timber removals for the Northern Rocky Mountain region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Output of roundwood products: Growing-stock trees	Output of roundwood products: Rough and rotten trees[1]	Output of roundwood products: Salvable dead trees[1]	Output of roundwood products: Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	3,217,557.0	501,959.0	493,210.0	.0	8,039.0	710.0	3,030,306.0
Do	Hardwoods	do	494.0	73.0	72.0	.0	1.0	.0	477.0
Total		do	3,218,051.0	502,032.0	493,282.0	.0	8,040.0	710.0	3,030,783.0
Veneer logs and bolts	Softwoods	do	400,061.0	62,412.0	61,335.0	.0	1,013.0	64.0	377,389.0
Do	Hardwoods	do	23.0	3.0	3.0	.0	.0	.0	18.0
Total		do	400,084.0	62,415.0	61,338.0	.0	1,013.0	64.0	377,407.0
Pulpwood	Softwoods	Standard cords	230,547.0	19,827.0	18,039.0	694.0	1,052.0	42.0	99,485.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Total		do	230,547.0	19,827.0	18,039.0	694.0	1,052.0	42.0	99,485.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	25.0	19.0	19.0	.0	.0	.0	89.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	288.0	4,545.0	4,539.0	.0	.0	.0	21,092.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	1,672.0	1,672.0	1,389.0	.0	.0	.0	3,606.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Posts (round and split)	Softwoods	Thousand pieces	3,260.0	3,688.0	3,042.0	.0	.0	.0	11,095.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	4,079.0	4,079.0	3,772.0	.0	.0	.0	18,829.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Summary, all miscellaneous	Softwoods		--	14,003.0	12,761.0	19.0	1,216.0	7.0	54,711.0
Do	Hardwoods		--	.0	.0	.0	.0	.0	.0
Total			--	14,003.0	12,761.0	19.0	1,216.0	7.0	54,711.0
Fuelwood	Softwoods	Standard cords	17,558.0	1,510.0	9.0	20.0	1,481.0	.0	7.0
Do	Hardwoods	do	2,744.0	236.0	1.0	4.0	231.0	.0	2.0
Total	All species	do	20,302.0	1,746.0	10.0	24.0	1,712.0	.0	9.0
Total, all products	Softwoods		--	599,711.0	585,354.0	733.0	12,801.0	823.0	3,561,898.0
Do	Hardwoods		--	312.0	76.0	4.0	232.0	.0	497.0
Do	All species		--	600,023.0	585,430.0	737.0	13,033.0	823.0	3,562,395.0
Additional removals:									
Logging residues	Softwoods		--	--	75,245.0	--	--	--	230,683.0
Do	Hardwoods		--	--	14.0	--	--	--	34.0
Total			--	--	75,259.0	--	--	--	230,717.0
Other removals	Softwoods		--	--	8,708.0	--	--	--	53,416.0
Do	Hardwoods		--	--	3.0	--	--	--	19.0
Total			--	--	8,711.0	--	--	--	53,435.0
Total removals	Softwoods		--	--	669,307.0	--	--	--	3,845,997.0
Do	Hardwoods		--	--	93.0	--	--	--	550.0
Total			--	--	669,400.0	--	--	--	3,846,547.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.65—*Output of timber products and timber removals for the Southern Rocky Mountain region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	889,189.0	138,725.0	136,807.0	.0	1,756.0	162.0	858,960.0
Do	Hardwoods	do	5,677.0	844.0	821.0	.0	20.0	3.0	5,290.0
Total		do	894,866.0	139,569.0	137,628.0	.0	1,776.0	165.0	864,250.0
Veneer logs and bolts	Softwoods	do	17,179.0	2,680.0	2,615.0	.0	54.0	11.0	16,330.0
Do	Hardwoods	do	115.0	18.0	18.0	.0	.0	.0	112.0
Total		do	17,294.0	2,698.0	2,633.0	.0	54.0	11.0	16,442.0
Pulpwood	Softwoods	Standard cords	61,907.0	5,324.0	5,324.0	.0	.0	.0	14,538.0
Do	Hardwoods	do	965.0	83.0	83.0	.0	.0	.0	177.0
Total		do	62,872.0	5,407.0	5,407.0	.0	.0	.0	14,715.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	64.0	893.0	889.0	.0	.0	.0	4,118.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	2,345.0	2,345.0	1,964.0	.0	.0	.0	4,934.0
Do	Hardwoods	do	114.0	114.0	67.0	.0	.0	.0	143.0
Posts (round and split)	Softwoods	Thousand pieces	237.0	235.0	164.0	.0	.0	.0	922.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	734.0	734.0	602.0	.0	.0	.0	2,318.0
Do	Hardwoods	do	1,517.0	1,517.0	1,477.0	.0	.0	.0	6,732.0
Summary, all miscellaneous	Softwoods		---	4,207.0	3,619.0	63.0	521.0	4.0	12,292.0
Do	Hardwoods		---	1,631.0	1,544.0	27.0	54.0	6.0	6,875.0
Total			---	5,838.0	5,163.0	90.0	575.0	10.0	19,167.0
Fuelwood	Softwoods	Standard cords	260,465.0	22,400.0	4,293.0	380.0	17,727.0	.0	9,545.0
Do	Hardwoods	do	6,849.0	589.0	10.0	15.0	564.0	.0	1.0
Total	All species	do	267,314.0	22,989.0	4,303.0	395.0	18,291.0	.0	9,546.0
Total, all products	Softwoods		---	173,336.0	152,658.0	443.0	20,058.0	177.0	911,665.0
Do	Hardwoods		---	3,165.0	2,476.0	42.0	638.0	9.0	12,455.0
Do	All species		---	176,501.0	155,134.0	485.0	20,696.0	186.0	924,120.0
Additional removals:									
Logging residues	Softwoods		---	---	16,162.0	---	---	---	46,055.0
Do	Hardwoods		---	---	291.0	---	---	---	690.0
Total			---	---	16,453.0	---	---	---	46,745.0
Other removals	Softwoods		---	---	3,970.0	---	---	---	23,944.0
Do	Hardwoods		---	---	194.0	---	---	---	1,002.0
Total			---	---	4,164.0	---	---	---	24,946.0
Total removals	Softwoods		---	---	172,790.0	---	---	---	981,664.0
Do	Hardwoods		---	---	2,961.0	---	---	---	14,147.0
Total			---	---	175,751.0	---	---	---	995,811.0

Table 3.66—*Output of timber products and timber removals for the Rocky Mountain region, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Output of roundwood products: Growing-stock trees	Output of roundwood products: Rough and rotten trees[1]	Output of roundwood products: Salvable dead trees[1]	Output of roundwood products: Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	4,106,746.0	640,684.0	630,017.0	.0	9,795.0	872.0	3,889,266.0
Do	Hardwoods	do	6,171.0	917.0	893.0	.0	21.0	3.0	5,767.0
Total		do	4,112,917.0	641,601.0	630,910.0	.0	9,816.0	875.0	3,895,033.0
Veneer logs and bolts	Softwoods	do	417,240.0	65,092.0	63,950.0	.0	1,067.0	75.0	393,719.0
Do	Hardwoods	do	138.0	21.0	21.0	.0	.0	.0	130.0
Total		do	417,378.0	65,113.0	63,971.0	.0	1,067.0	75.0	393,849.0
Pulpwood	Softwoods	Standard cords	292,454.0	25,151.0	23,363.0	694.0	1,052.0	42.0	114,023.0
Do	Hardwoods	do	965.0	83.0	83.0	.0	.0	.0	177.0
Total		do	293,419.0	25,234.0	23,446.0	694.0	1,052.0	42.0	114,200.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Piling	Softwoods	Thousand linear feet	25.0	19.0	19.0	.0	.0	.0	89.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Poles	Softwoods	Thousand pieces	352.0	5,438.0	5,428.0	.0	.0	.0	25,210.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	4,017.0	4,017.0	3,353.0	.0	.0	.0	8,540.0
Do	Hardwoods	do	114.0	114.0	67.0	.0	.0	.0	143.0
Posts (round and split)	Softwoods	Thousand pieces	3,497.0	3,923.0	3,206.0	.0	.0	.0	12,017.0
Do	Hardwoods	do	.0	.0	.0	.0	.0	.0	.0
Other	Softwoods	Thousand cubic feet	4,813.0	4,813.0	4,374.0	.0	.0	.0	21,147.0
Do	Hardwoods	do	1,517.0	1,517.0	1,477.0	.0	.0	.0	6,732.0
Summary, all miscellaneous	Softwoods		----	18,210.0	16,380.0	82.0	1,737.0	11.0	67,003.0
Do	Hardwoods		----	1,631.0	1,544.0	27.0	54.0	6.0	6,875.0
Total			----	19,841.0	17,924.0	109.0	1,791.0	17.0	73,878.0
Fuelwood	Softwoods	Standard cords	278,023.0	23,910.0	4,302.0	400.0	19,208.0	.0	9,552.0
Do	Hardwoods	do	9,593.0	825.0	11.0	19.0	795.0	.0	3.0
Total	All species	do	287,616.0	24,735.0	4,313.0	419.0	20,003.0	.0	9,555.0
Total, all products	Softwoods		----	773,047.0	738,012.0	1,176.0	32,859.0	1,000.0	4,473,563.0
Do	Hardwoods		----	3,477.0	2,552.0	46.0	870.0	9.0	12,952.0
Do	All species		----	776,524.0	740,564.0	1,222.0	33,729.0	1,009.0	4,486,515.0
Additional removals:									
Logging residues	Softwoods		----	----	91,407.0	----	----	----	276,738.0
Do	Hardwoods		----	----	305.0	----	----	----	724.0
Total			----	----	91,712.0	----	----	----	277,462.0
Other removals	Softwoods		----	----	12,678.0	----	----	----	77,360.0
Do	Hardwoods		----	----	197.0	----	----	----	1,021.0
Total			----	----	12,875.0	----	----	----	78,381.0
Total removals	Softwoods		----	----	842,097.0	----	----	----	4,827,661.0
Do	Hardwoods		----	----	3,054.0	----	----	----	14,697.0
Total			----	----	845,151.0	----	----	----	4,842,358.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.67—*Output of timber products and timber removals for the United States, by source of material, product, and softwoods and hardwoods, 1976*

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing-stock trees	Rough and rotten trees[1]	Salvable dead trees[1]	Other sources[1]	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*
Saw logs	Softwoods	Thousand board feet	32,552,378.0	5,209,948.0	4,986,595.0	13,573.0	112,088.0	97,692.0	30,477,698.0
Do	Hardwoods	do	8,418,273.0	1,432,326.0	1,345,002.0	55,326.0	12,521.0	19,477.0	7,348,693.0
Total		do	40,970,651.0	6,642,274.0	6,331,597.0	68,899.0	124,609.0	117,169.0	37,826,391.0
Veneer logs and bolts	Softwoods	do	8,925,586.0	1,330,130.0	1,226,250.0	7,253.0	38,073.0	58,554.0	8,124,096.0
Do	Hardwoods	do	611,662.0	100,420.0	95,705.0	3,254.0	181.0	1,280.0	570,365.0
Total		do	9,537,248.0	1,430,550.0	1,321,955.0	10,507.0	38,254.0	59,834.0	8,694,461.0
Pulpwood	Softwoods	Standard cords	32,924,566.0	2,608,175.0	2,350,375.0	44,095.0	22,047.0	191,658.0	7,313,501.0
Do	Hardwoods	do	14,546,905.0	1,155,261.0	1,005,857.0	73,656.0	8,626.0	67,122.0	2,564,020.0
Total		do	47,471,471.0	3,763,436.0	3,356,232.0	117,751.0	30,673.0	258,780.0	9,877,521.0
Miscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	6,034.0	1,008.0	962.0	.0	.0	.0	4,610.0
Do	Hardwoods	do	88,265.0	13,587.0	12,793.0	.0	.0	.0	79,198.0
Piling	Softwoods	Thousand linear feet	37,395.0	25,867.0	25,586.0	.0	.0	.0	142,643.0
Do	Hardwoods	do	1,874.0	1,033.0	1,012.0	.0	.0	.0	4,027.0
Poles	Softwoods	Thousand pieces	6,161.0	89,401.0	88,712.0	.0	.0	.0	442,563.0
Do	Hardwoods	do	21.0	383.0	306.0	.0	.0	.0	.0
Mine timbers (round)	Softwoods	Thousand cubic feet	5,955.0	5,955.0	5,152.0	.0	.0	.0	13,841.0
Do	Hardwoods	do	17,662.0	17,662.0	16,876.0	.0	.0	.0	43,659.0
Posts (round and split)	Softwoods	Thousand pieces	48,031.0	35,310.0	29,557.0	.0	.0	.0	27,817.0
Do	Hardwoods	do	13,516.0	10,268.0	7,910.0	.0	.0	.0	17,653.0
Other	Softwoods	Thousand cubic feet	80,848.0	80,848.0	75,799.0	.0	.0	.0	380,152.0
Do	Hardwoods	do	96,179.0	96,179.0	78,534.0	.0	.0	.0	299,969.0
Summary, all miscellaneous	Softwoods		----------	238,389.0	225,768.0	1,547.0	4,744.0	6,330.0	1,011,626.0
Do	Hardwoods		----------	139,112.0	117,431.0	12,765.0	1,494.0	7,422.0	444,506.0
Total			----------	377,501.0	343,199.0	14,312.0	6,238.0	13,752.0	1,456,132.0
Fuelwood	Softwoods	Standard cords	1,683,333.0	131,622.0	62,923.0	6,589.0	47,973.0	14,137.0	135,094.0
Do	Hardwoods	do	6,419,190.0	469,985.0	271,502.0	54,343.0	32,440.0	111,700.0	562,660.0
Total	All species	do	8,102,523.0	601,607.0	334,425.0	60,932.0	80,413.0	125,837.0	697,754.0
Total, all products	Softwoods		----------	9,518,264.0	8,851,911.0	73,057.0	224,925.0	368,371.0	47,062,015.0
Do	Hardwoods		----------	3,297,104.0	2,835,497.0	199,344.0	55,262.0	207,001.0	11,490,244.0
Do	All species		----------	12,815,368.0	11,687,408.0	272,401.0	280,187.0	575,372.0	58,552,259.0
Additional removals:									
Logging residues	Softwoods		----------	----------	812,858.0	----------	----------	----------	2,277,134.0
Do	Hardwoods		----------	----------	585,311.0	----------	----------	----------	1,155,945.0
Total			----------	----------	1,398,169.0	----------	----------	----------	3,433,079.0
Other removals	Softwoods		----------	----------	381,315.0	----------	----------	----------	1,507,564.0
Do	Hardwoods		----------	----------	762,100.0	----------	----------	----------	1,683,088.0
Total			----------	----------	1,143,415.0	----------	----------	----------	3,190,652.0
Total removals	Softwoods		----------	----------	10,046,084.0	----------	----------	----------	50,846,713.0
Do	Hardwoods		----------	----------	4,182,908.0	----------	----------	----------	14,329,277.0
Total			----------	----------	14,228,992.0	----------	----------	----------	65,175,990.0

[1]Output from nongrowing stock sources is not shown for miscellaneous products except in combined form.

Table 3.68—*Volume of residues at primary manufacturing plants in the United States, by industrial source, type of material, section, region, and softwoods and hardwoods, 1976*

[Thousand cubic feet]

Section, region and species group	All industries			Lumber industry			Veneer and plywood industries			Other primary industries		
	Total	Coarse	Fine	Total	Coarse	Fine	Total	Coarse	Fine	Total	Coarse	Fine
New England:												
Softwoods	13,443.0	7,050.0	6,393.0	13,133.0	6,906.0	6,227.0	.0	.0	.0	310.0	144.0	166.0
Hardwoods	7,265.0	4,354.0	2,911.0	7,105.0	4,308.0	2,797.0	106.0	10.0	96.0	54.0	36.0	18.0
Total	20,708.0	11,404.0	9,304.0	20,238.0	11,214.0	9,024.0	106.0	10.0	96.0	364.0	180.0	184.0
Middle Atlantic:												
Softwoods	6,124.0	4,092.0	2,032.0	6,113.0	4,087.0	2,026.0	.0	.0	.0	11.0	5.0	6.0
Hardwoods	25,341.0	16,517.0	8,824.0	24,546.0	15,962.0	8,584.0	135.0	124.0	11.0	660.0	431.0	229.0
Total	31,465.0	20,609.0	10,856.0	30,659.0	20,049.0	10,610.0	135.0	124.0	11.0	671.0	436.0	235.0
Lake States:												
Softwoods	3,335.0	1,076.0	2,259.0	3,327.0	1,073.0	2,254.0	8.0	3.0	5.0	.0	.0	.0
Hardwoods	17,402.0	5,637.0	11,765.0	16,146.0	5,616.0	10,530.0	1,192.0	14.0	1,178.0	64.0	7.0	57.0
Total	20,737.0	6,713.0	14,024.0	19,473.0	6,689.0	12,784.0	1,200.0	17.0	1,183.0	64.0	7.0	57.0
Central States:												
Softwoods	3,986.0	2,252.0	1,734.0	3,986.0	2,252.0	1,734.0	.0	.0	.0	.0	.0	.0
Hardwoods	40,507.0	18,427.0	22,080.0	35,887.0	15,235.0	20,652.0	485.0	324.0	161.0	4,135.0	2,868.0	1,267.0
Total	44,493.0	20,679.0	23,814.0	39,873.0	17,487.0	22,386.0	485.0	324.0	161.0	4,135.0	2,868.0	1,267.0
Total, North:												
Softwoods	26,888.0	14,470.0	12,418.0	26,559.0	14,318.0	12,241.0	8.0	3.0	5.0	321.0	149.0	172.0
Hardwoods	90,515.0	44,935.0	45,580.0	83,684.0	41,121.0	42,563.0	1,918.0	472.0	1,446.0	4,913.0	3,342.0	1,571.0
Total	117,403.0	59,405.0	57,998.0	110,243.0	55,439.0	54,804.0	1,926.0	475.0	1,451.0	5,234.0	3,491.0	1,743.0
South Atlantic:												
Softwoods	21,268.0	4,844.0	16,424.0	20,229.0	4,710.0	15,519.0	889.0	.0	889.0	150.0	134.0	16.0
Hardwoods	25,832.0	5,391.0	20,441.0	25,037.0	5,274.0	19,763.0	668.0	56.0	612.0	127.0	61.0	66.0
Total	47,100.0	10,235.0	36,865.0	45,266.0	9,984.0	35,282.0	1,557.0	56.0	1,501.0	277.0	195.0	82.0
East Gulf:												
Softwoods	16,634.0	3,124.0	13,510.0	16,189.0	2,957.0	13,232.0	171.0	2.0	169.0	274.0	165.0	109.0
Hardwoods	10,864.0	2,208.0	8,656.0	9,125.0	2,028.0	7,097.0	1,572.0	60.0	1,512.0	167.0	120.0	47.0
Total	27,498.0	5,332.0	22,166.0	25,314.0	4,985.0	20,329.0	1,743.0	62.0	1,681.0	441.0	285.0	156.0
Central Gulf:												
Softwoods	27,950.0	6,702.0	21,248.0	23,034.0	4,260.0	18,774.0	2,547.0	1,965.0	582.0	2,369.0	477.0	1,892.0
Hardwoods	37,634.0	8,940.0	28,694.0	35,801.0	8,148.0	27,653.0	642.0	493.0	149.0	1,191.0	299.0	892.0
Total	65,584.0	15,642.0	49,942.0	58,835.0	12,408.0	46,427.0	3,189.0	2,458.0	731.0	3,560.0	776.0	2,784.0
West Gulf:												
Softwoods	37,547.0	14,064.0	23,483.0	31,779.0	12,413.0	19,366.0	1,133.0	96.0	1,037.0	4,635.0	1,555.0	3,080.0
Hardwoods	35,362.0	15,175.0	20,187.0	28,374.0	11,664.0	16,710.0	283.0	226.0	57.0	6,705.0	3,285.0	3,420.0
Total	72,909.0	29,239.0	43,670.0	60,153.0	24,077.0	36,076.0	1,416.0	322.0	1,094.0	11,340.0	4,840.0	6,500.0
Total, South:												
Softwoods	103,399.0	28,734.0	74,665.0	91,231.0	24,340.0	66,891.0	4,740.0	2,063.0	2,677.0	7,428.0	2,331.0	5,097.0
Hardwoods	109,692.0	31,714.0	77,978.0	98,337.0	27,114.0	71,223.0	3,165.0	835.0	2,330.0	8,190.0	3,765.0	4,425.0
Total	213,091.0	60,448.0	152,643.0	189,568.0	51,454.0	138,114.0	7,905.0	2,898.0	5,007.0	15,618.0	6,096.0	9,522.0
Total, eastern regions:												
Softwoods	130,287.0	43,204.0	87,083.0	117,790.0	38,658.0	79,132.0	4,748.0	2,066.0	2,682.0	7,749.0	2,480.0	5,269.0
Hardwoods	200,207.0	76,649.0	123,558.0	182,021.0	68,235.0	113,786.0	5,083.0	1,307.0	3,776.0	13,103.0	7,107.0	5,996.0
Total	330,494.0	119,853.0	210,641.0	299,811.0	106,893.0	192,918.0	9,831.0	3,373.0	6,458.0	20,852.0	9,587.0	11,265.0
Pacific Northwest: Douglas-fir subregion (Western Oregon and western Washington):												
Softwoods	30,515.0	12,019.0	18,496.0	14,780.0	3,792.0	10,988.0	4,136.0	3,876.0	260.0	11,599.0	4,351.0	7,248.0
Hardwoods	102.0	61.0	41.0	102.0	61.0	41.0	.0	.0	.0	.0	.0	.0
Total	30,617.0	12,080.0	18,537.0	14,882.0	3,853.0	11,029.0	4,136.0	3,876.0	260.0	11,599.0	4,351.0	7,248.0

Table 3.68—*Volume of residues at primary manufacturing plants in the United States, by industrial source, type of material, section, region, and softwoods and hardwoods, 1976—Cont'd.*

[Thousand cubic feet]

Section, region and species group	All industries			Lumber industry			Veneer and plywood industries			Other primary industries		
	Total	Coarse	Fine	Total	Coarse	Fine	Total	Coarse	Fine	Total	Coarse	Fine
Pine subregion (Eastern Oregon and eastern Washington):												
Softwoods	19,886.0	7,361.0	12,525.0	17,023.0	4,580.0	12,443.0	2,832.0	2,754.0	78.0	31.0	27.0	4.0
Hardwoods	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	19,886.0	7,361.0	12,525.0	17,023.0	4,580.0	12,443.0	2,832.0	2,754.0	78.0	31.0	27.0	4.0
Coastal Alaska:												
Softwoods	3,431.0	2,900.0	531.0	3,431.0	2,900.0	531.0	.0	.0	.0	.0	.0	.0
Hardwoods	7.0	6.0	1.0	7.0	6.0	1.0	.0	.0	.0	.0	.0	.0
Total	3,438.0	2,906.0	532.0	3,438.0	2,906.0	532.0	.0	.0	.0	.0	.0	.0
Interior Alaska:												
Softwoods	78.0	.0	78.0	78.0	.0	78.0	.0	.0	.0	.0	.0	.0
Hardwoods	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total	78.0	.0	78.0	78.0	.0	78.0	.0	.0	.0	.0	.0	.0
Total, Pacific Northwest:												
Softwoods	53,910.0	22,280.0	31,630.0	35,312.0	11,272.0	24,040.0	6,968.0	6,630.0	338.0	11,630.0	4,378.0	7,252.0
Hardwoods	109.0	67.0	42.0	109.0	67.0	42.0	.0	.0	.0	.0	.0	.0
Total	54,019.0	22,347.0	31,672.0	35,421.0	11,339.0	24,082.0	6,968.0	6,630.0	338.0	11,630.0	4,378.0	7,252.0
Pacific Southwest:												
Softwoods	54,930.0	18,524.0	36,406.0	53,303.0	16,953.0	36,350.0	1,610.0	1,554.0	56.0	17.0	17.0	.0
Hardwoods	102.0	32.0	70.0	102.0	32.0	70.0	.0	.0	.0	.0	.0	.0
Total	55,032.0	18,556.0	36,476.0	53,405.0	16,985.0	36,420.0	1,610.0	1,554.0	56.0	17.0	17.0	.0
Total, Pacific Coast:												
Softwoods	108,840.0	40,804.0	68,036.0	88,615.0	28,225.0	60,390.0	8,578.0	8,184.0	394.0	11,647.0	4,395.0	7,252.0
Hardwoods	211.0	99.0	112.0	211.0	99.0	112.0	.0	.0	.0	.0	.0	.0
Total	109,051.0	40,903.0	68,148.0	88,826.0	28,324.0	60,502.0	8,578.0	8,184.0	394.0	11,647.0	4,395.0	7,252.0
Northern Rocky Mountain:												
Softwoods	83,653.0	30,869.0	52,784.0	83,367.0	30,583.0	52,784.0	286.0	286.0	.0	.0	.0	.0
Hardwoods	10.0	5.0	5.0	10.0	5.0	5.0	.0	.0	.0	.0	.0	.0
Total	83,663.0	30,874.0	52,789.0	83,377.0	30,588.0	52,789.0	286.0	286.0	.0	.0	.0	.0
Southern Rocky Mountain:												
Softwoods	22,520.0	7,390.0	15,130.0	22,520.0	7,390.0	15,130.0	.0	.0	.0	.0	.0	.0
Hardwood	488.0	217.0	271.0	482.0	211.0	271.0	6.0	6.0	.0	.0	.0	.0
Total	23,008.0	7,607.0	15,401.0	23,002.0	7,601.0	15,401.0	6.0	6.0	.0	.0	.0	.0
Total, Rocky Mountain:												
Softwoods	106,173.0	38,259.0	67,914.0	105,887.0	37,973.0	67,914.0	286.0	286.0	.0	.0	.0	.0
Hardwoods	498.0	222.0	276.0	492.0	216.0	276.0	6.0	6.0	.0	.0	.0	.0
Total	106,671.0	38,481.0	68,190.0	106,379.0	38,189.0	68,190.0	292.0	292.0	.0	.0	.0	.0
Total, western region:												
Softwoods	215,013.0	79,063.0	135,950.0	194,502.0	66,198.0	128,304.0	8,864.0	8,470.0	394.0	11,647.0	4,395.0	7,252.0
Hardwoods	709.0	321.0	388.0	703.0	315.0	388.0	6.0	6.0	.0	.0	.0	.0
Total	215,722.0	79,384.0	136,338.0	195,205.0	66,513.0	128,692.0	8,870.0	8,476.0	394.0	11,647.0	4,395.0	7,252.0
Total, all regions:												
Softwoods	345,300.0	122,267.0	223,033.0	312,292.0	104,856.0	207,436.0	13,612.0	10,536.0	3,076.0	19,396.0	6,875.0	12,521.0
Hardwoods	200,916.0	76,970.0	123,946.0	182,724.0	68,550.0	114,174.0	5,089.0	1,313.0	3,776.0	13,103.0	7,107.0	5,996.0
Total	546,216.0	199,237.0	346,979.0	495,016.0	173,406.0	321,610.0	18,701.0	11,849.0	6,852.0	32,499.0	13,982.0	18,517.0

Table 3.69—*Roundwood products, logging residues, and other removals from growing stock and sawtimber, by section, region, State, and softwoods and hardwoods, 1976*

Section, region and State	Species group	Roundwood products: All sources	Roundwood products: Growing stock	Roundwood products: Saw-timber	Logging residues: Growing stock	Logging residues: Saw-timber	Other removals: Growing stock	Other removals: Saw-timber
		Thousand cubic feet	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*
New England:								
Connecticut	Softwoods	1,841.0	1,581.0	6,006.0	132.0	148.0	462.0	69.0
Do	Hardwoods	4,369.0	3,896.0	15,643.0	791.0	427.0	9,905.0	854.0
Maine	Softwoods	299,605.0	251,737.0	953,248.0	39,317.0	30,597.0	7,926.0	28,487.0
Do	Hardwoods	135,959.0	119,590.0	387,768.0	21,629.0	29,654.0	5,938.0	14,690.0
Massachusetts	Softwoods	10,797.0	9,306.0	39,403.0	773.0	902.0	8,940.0	17,468.0
Do	Hardwoods	5,829.0	5,328.0	21,865.0	1,106.0	600.0	9,901.0	15,513.0
New Hampshire	Softwoods	33,593.0	29,779.0	136,329.0	5,328.0	7,504.0	6,179.0	15,246.0
Do	Hardwoods	21,848.0	17,614.0	71,093.0	5,163.0	9,938.0	5,178.0	8,801.0
Rhode Island	Softwoods	350.0	270.0	954.0	26.0	27.0	80.0	63.0
Do	Hardwoods	1,438.0	1,052.0	3,324.0	186.0	86.0	1,415.0	2,289.0
Vermont	Softwoods	26,303.0	23,594.0	101,132.0	4,874.0	8,418.0	5,334.0	9,107.0
Do	Hardwoods	28,525.0	23,519.0	100,040.0	6,604.0	13,553.0	4,746.0	10,095.0
Total	Softwoods	372,489.0	316,267.0	1,237,072.0	50,450.0	47,596.0	28,921.0	70,440.0
	Hardwoods	197,968.0	170,999.0	599,733.0	35,479.0	54,258.0	37,083.0	52,242.0
Middle Atlantic:								
Delaware	Softwoods	5,454.0	4,658.0	13,638.0	1,021.0	1,910.0	392.0	852.0
Do	Hardwoods	2,875.0	2,338.0	9,109.0	1,021.0	845.0	1,760.0	2,511.0
Maryland	Softwoods	19,050.0	16,435.0	48,334.0	3,060.0	1,909.0	1,306.0	2,061.0
Do	Hardwoods	27,913.0	26,141.0	117,592.0	10,470.0	8,018.0	6,063.0	12,272.0
New Jersey	Softwoods	3,291.0	2,825.0	6,650.0	141.0	112.0	2,175.0	548.0
Do	Hardwoods	5,963.0	5,118.0	10,525.0	888.0	311.0	770.0	2,226.0
New York	Softwoods	37,242.0	35,083.0	101,253.0	7,221.0	6,038.0	4,551.0	9,765.0
Do	Hardwoods	98,521.0	86,531.0	407,379.0	19,736.0	15,959.0	11,381.0	30,013.0
Pennsylvania	Softwoods	12,054.0	11,317.0	43,194.0	1,148.0	780.0	718.0	981.0
Do	Hardwoods	164,400.0	159,251.0	615,606.0	53,245.0	19,134.0	19,531.0	28,787.0
West Virginia	Softwoods	12,060.0	8,404.0	25,574.0	1,545.0	1,579.0	938.0	1,159.0
Do	Hardwoods	98,084.0	91,500.0	346,540.0	39,466.0	26,428.0	24,923.0	33,487.0
Total	Softwoods	89,151.0	78,722.0	238,643.0	14,136.0	12,328.0	10,080.0	15,366.0
	Hardwoods	397,756.0	370,879.0	1,506,751.0	124,826.0	70,695.0	64,428.0	109,296.0
Lake States:								
Michigan	Softwoods	52,436.0	49,391.0	135,196.0	1,246.0	1,758.0	17,663.0	99,046.0
Do	Hardwoods	175,214.0	153,013.0	574,119.0	13,498.0	28,361.0	19,589.0	1,520.0
Minnesota	Softwoods	60,806.0	56,950.0	154,582.0	1,157.0	830.0	10,693.0	14,530.0
Do	Hardwoods	96,653.0	78,085.0	219,341.0	3,903.0	6,124.0	42,812.0	64,900.0
North Dakota	Softwoods	12.0	7.0	8.0	.0	.0	.0	.0
Do	Hardwoods	4,564.0	2,183.0	6,945.0	32.0	132.0	385.0	1,923.0
South Dakota (East)	Softwoods	434.0	207.0	480.0	1.0	.0	92.0	520.0
Do	Hardwoods	1,662.0	777.0	2,182.0	.0	.0	223.0	818.0
Wisconsin	Softwoods	43,353.0	40,674.0	109,892.0	844.0	683.0	2,382.0	10,925.0
Do	Hardwoods	193,154.0	160,171.0	505,441.0	12,201.0	21,595.0	51,210.0	82,168.0
Total	Softwoods	157,041.0	147,229.0	400,158.0	3,248.0	3,271.0	30,830.0	125,021.0
	Hardwoods	471,247.0	394,229.0	1,308,028.0	29,634.0	56,212.0	114,219.0	151,329.0
Central States:								
Illinois	Softwoods	308.0	301.0	430.0	4.0	1.0	695.0	569.0
Do	Hardwoods	52,505.0	37,127.0	201,993.0	6,816.0	11,567.0	44,257.0	127,440.0
Indiana	Softwoods	78.0	74.0	370.0	2.0	1.0	1,724.0	5,629.0
Do	Hardwoods	53,877.0	38,117.0	207,258.0	6,690.0	11,182.0	14,393.0	17,560.0
Iowa	Softwoods	67.0	35.0	148.0	2.0	3.0	163.0	149.0
Do	Hardwoods	24,291.0	13,656.0	64,872.0	1,771.0	2,931.0	38,973.0	55,197.0
Kansas	Softwoods	6.0	5.0	.0	.0	.0	.0	.0
Do	Hardwoods	12,436.0	8,091.0	38,732.0	526.0	2,103.0	1,283.0	1,165.0
Kentucky	Softwoods	11,070.0	8,639.0	31,489.0	1,106.0	1,639.0	2,590.0	2,654.0
Do	Hardwoods	90,774.0	81,181.0	481,748.0	23,585.0	42,997.0	25,359.0	65,062.0
Missouri	Softwoods	4,252.0	3,885.0	16,411.0	239.0	337.0	4,276.0	8,252.0
Do	Hardwoods	109,702.0	59,521.0	257,358.0	10,695.0	16,328.0	89,984.0	132,314.0
Nebraska	Softwoods	464.0	464.0	1,624.0	14.0	20.0	122.0	356.0
Do	Hardwoods	6,308.0	5,123.0	29,977.0	519.0	2,108.0	1,458.0	3,915.0
Ohio	Softwoods	1,028.0	847.0	1,688.0	48.0	21.0	239.0	727.0
Do	Hardwoods	84,973.0	75,373.0	404,561.0	18,720.0	73,737.0	8,466.0	29,593.0
Total	Softwoods	17,273.0	14,250.0	52,160.0	1,415.0	2,022.0	9,809.0	18,336.0
	Hardwoods	434,866.0	318,189.0	1,686,499.0	69,322.0	162,953.0	224,173.0	432,246.0
Total, North	Softwoods	635,954.0	556,468.0	1,928,033.0	69,249.0	65,217.0	79,640.0	229,163.0
	Hardwoods	1,501,837.0	1,254,296.0	5,101,011.0	259,261.0	344,118.0	439,903.0	745,113.0

Table 3.69—*Roundwood products, logging residues, and other removals from growing stock and sawtimber, by section, region, State, and softwoods and hardwoods, 1976—Cont'd.*

Section, region and State	Species group	Roundwood products: All sources	Roundwood products: Growing stock	Roundwood products: Saw-timber	Logging residues: Growing stock	Logging residues: Saw-timber	Other removals: Growing stock	Other removals: Saw-timber
		Thousand cubic feet	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*
South Atlantic:								
North Carolina	Softwoods	374,715.0	350,680.0	1,457,743.0	22,777.0	22,776.0	39,170.0	99,952.0
Do	Hardwoods	182,471.0	165,196.0	652,279.0	35,631.0	49,091.0	52,551.0	124,202.0
South Carolina	Softwoods	344,342.0	326,168.0	1,181,214.0	20,709.0	37,482.0	16,423.0	50,303.0
Do	Hardwoods	116,873.0	96,926.0	306,391.0	24,529.0	75,497.0	17,448.0	33,872.0
Virginia	Softwoods	205,301.0	173,449.0	657,357.0	11,850.0	15,788.0	19,926.0	41,363.0
Do	Hardwoods	258,262.0	207,427.0	800,158.0	34,914.0	33,506.0	48,432.0	132,310.0
Total	Softwoods	924,358.0	850,297.0	3,296,314.0	55,336.0	76,046.0	75,519.0	191,618.0
	Hardwoods	557,606.0	469,549.0	1,758,828.0	95,074.0	158,094.0	118,431.0	290,384.0
East Gulf:								
Florida	Softwoods	246,480.0	228,955.0	817,689.0	13,770.0	32,020.0	26,942.0	82,906.0
Do	Hardwoods	33,924.0	26,455.0	90,186.0	8,876.0	19,658.0	21,012.0	41,424.0
Georgia	Softwoods	681,913.0	640,367.0	2,381,718.0	72,291.0	263,139.0	65,327.0	256,820.0
Do	Hardwoods	141,380.0	135,319.0	489,942.0	50,700.0	149,988.0	77,105.0	254,590.0
Total	Softwoods	928,393.0	869,322.0	3,199,407.0	86,061.0	295,159.0	92,269.0	339,726.0
	Hardwoods	175,304.0	161,774.0	580,128.0	59,576.0	169,646.0	98,117.0	296,014.0
Central Gulf:								
Alabama	Softwoods	606,482.0	581,671.0	2,561,791.0	20,050.0	90,897.0	10,092.0	49,803.0
Do	Hardwoods	207,556.0	185,469.0	749,071.0	16,017.0	64,650.0	16,785.0	31,738.0
Mississippi	Softwoods	484,004.0	467,814.0	2,286,976.0	20,354.0	42,690.0	4,196.0	12,970.0
Do	Hardwoods	219,708.0	201,350.0	882,188.0	20,013.0	76,676.0	19,760.0	77,200.0
Tennessee	Softwoods	30,105.0	28,816.0	122,101.0	2,034.0	3,420.0	3,450.0	.0
Do	Hardwoods	118,346.0	106,223.0	500,710.0	32,199.0	69,656.0	23,422.0	94,970.0
Total	Softwoods	1,120,591.0	1,078,301.0	4,970,868.0	42,438.0	137,007.0	17,738.0	62,773.0
	Hardwoods	545,610.0	493,042.0	2,131,969.0	68,229.0	210,982.0	59,967.0	203,908.0
West Gulf:								
Arkansas	Softwoods	354,089.0	344,831.0	1,732,873.0	33,142.0	59,773.0	4,331.0	19,864.0
Do	Hardwoods	184,461.0	162,423.0	627,353.0	43,172.0	96,005.0	13,335.0	47,437.0
Louisiana	Softwoods	451,654.0	437,943.0	2,220,827.0	16,046.0	43,963.0	1,831.0	9,295.0
Do	Hardwoods	137,510.0	125,689.0	596,304.0	17,402.0	73,583.0	18,512.0	58,283.0
Oklahoma	Softwoods	57,223.0	55,674.0	274,104.0	5,746.0	10,436.0	.0	.0
Do	Hardwoods	18,102.0	15,277.0	61,824.0	2,891.0	6,332.0	2,587.0	5,807.0
Texas	Softwoods	397,289.0	384,565.0	1,934,252.0	13,510.0	38,408.0	6,184.0	25,784.0
Do	Hardwoods	72,915.0	61,875.0	275,025.0	9,566.0	40,121.0	3,651.0	10,241.0
Total	Softwoods	1,260,255.0	1,223,013.0	6,162,056.0	68,444.0	152,580.0	12,346.0	54,943.0
	Hardwoods	412,988.0	365,264.0	1,560,506.0	73,031.0	216,041.0	38,085.0	121,768.0
Total, South	Softwoods	4,233,597.0	4,020,933.0	17,628,645.0	252,279.0	660,792.0	197,872.0	649,060.0
	Hardwoods	1,691,508.0	1,489,629.0	6,031,431.0	295,910.0	754,763.0	314,600.0	912,074.0
Pacific Northwest:								
Alaska:								
Coastal	Softwoods	108,819.0	101,243.0	641,506.0	4,643.0	22,105.0	.0	.0
Do	Hardwoods	22.0	22.0	138.0	.0	.0	.0	.0
Interior	Softwoods	6,428.0	1,551.0	9,165.0	.0	.0	.0	.0
Do	Hardwoods	3,142.0	3,142.0	18,570.0	.0	.0	.0	.0
Summary	Softwoods	115,247.0	102,794.0	650,671.0	4,643.0	22,105.0	.0	.0
Do	Hardwoods	3,164.0	3,164.0	18,708.0	.0	.0	.0	.0
Oregon:								
Western	Softwoods	1,347,720.0	1,200,436.0	8,211,910.0	180,925.0	582,580.0	25,860.0	151,800.0
Do	Hardwoods	17,061.0	15,521.0	56,031.0	4,440.0	9,945.0	420.0	1,400.0
Eastern	Softwoods	413,165.0	400,479.0	2,292,871.0	25,630.0	77,145.0	18,420.0	115,125.0
Do	Hardwoods	3.0	3.0	13.0	5.0	15.0	.0	.0
Summary	Softwoods	1,760,885.0	1,600,915.0	10,504,781.0	206,555.0	659,725.0	44,280.0	266,925.0
Do	Hardwoods	17,064.0	15,524.0	56,044.0	4,445.0	9,960.0	420.0	1,400.0

Table 3.69—*Roundwood products, logging residues, and other removals from growing stock and sawtimber, by section, region, State, and softwoods and hardwoods, 1976—Cont'd.*

Section, region and State	Species group	Roundwood products: All sources	Roundwood products: Growing stock	Roundwood products: Saw-timber	Logging residues: Growing stock	Logging residues: Saw-timber	Other removals: Growing stock	Other removals: Saw-timber
		Thousand cubic feet	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*	*Thousand cubic feet*	*Thousand board feet*
Washington:								
Western	Softwoods	1,054,458.0	950,643.0	6,231,573.0	95,180.0	306,480.0	13,605.0	79,860.0
Do	Hardwoods	66,760.0	62,141.0	232,844.0	17,770.0	39,805.0	5,965.0	19,865.0
Eastern	Softwoods	179,506.0	171,904.0	982,313.0	10,835.0	32,615.0	7,790.0	48,690.0
Do	Hardwoods	12.0	11.0	49.0	10.0	30.0	.0	.0
Summary	Softwoods	1,233,964.0	1,122,547.0	7,213,886.0	106,015.0	339,095.0	21,395.0	128,550.0
Do	Hardwoods	66,772.0	62,152.0	232,893.0	17,780.0	39,835.0	5,965.0	19,865.0
Total	Softwoods	3,110,096.0	2,826,256.0	18,369,338.0	317,213.0	1,020,925.0	65,675.0	395,475.0
Do	Hardwoods	87,000.0	80,840.0	307,645.0	22,225.0	49,795.0	6,385.0	21,265.0
Pacific Southwest:								
California	Softwoods	765,570.0	710,242.0	4,662,436.0	82,710.0	253,462.0	25,450.0	156,506.0
Do	Hardwoods	10,631.0	5,872.0	21,052.0	7,610.0	6,545.0	1,015.0	3,615.0
Hawaii	Softwoods	.0	.0	.0	.0	.0	.0	.0
Do	Hardwoods	2,651.0	2,308.0	16,153.0	.0	.0	.0	.0
Total	Softwoods	765,570.0	710,242.0	4,662,436.0	82,710.0	253,462.0	25,450.0	156,506.0
Do	Hardwoods	13,282.0	8,180.0	37,205.0	7,610.0	6,545.0	1,015.0	3,615.0
Total, Pacific Coast	Softwoods	3,875,666.0	3,536,498.0	23,031,774.0	399,923.0	1,274,387.0	91,125.0	551,981.0
Do	Hardwoods	100,282.0	89,020.0	344,850.0	29,835.0	56,340.0	7,400.0	24,880.0
Northern Rocky Mountain:								
Idaho	Softwoods	359,710.0	349,487.0	2,160,972.0	41,276.0	129,617.0	4,017.0	25,016.0
Do	Hardwoods	253.0	17.0	122.0	6.0	17.0	1.0	3.0
Montana	Softwoods	202,338.0	199,261.0	1,188,389.0	31,849.0	97,971.0	3,682.0	22,231.0
Do	Hardwoods	7.0	7.0	41.0	3.0	10.0	.0	2.0
South Dakota (West)	Softwoods	19,656.0	19,369.0	114,724.0	801.0	1,030.0	240.0	1,419.0
Do	Hardwoods	.0	.0	.0	.0	.0	.0	.0
Wyoming	Softwoods	18,007.0	17,237.0	97,813.0	1,319.0	2,065.0	769.0	4,750.0
Do	Hardwoods	52.0	52.0	334.0	5.0	7.0	2.0	14.0
Total	Softwoods	599,711.0	585,354.0	3,561,898.0	75,245.0	230,683.0	8,708.0	53,416.0
Do	Hardwoods	312.0	76.0	497.0	14.0	34.0	3.0	19.0
Southern Rocky Mountain:								
Arizona	Softwoods	84,786.0	74,766.0	437,028.0	7,943.0	21,758.0	532.0	3,112.0
Do	Hardwoods	125.0	106.0	250.0	3.0	4.0	2.0	6.0
Colorado	Softwoods	33,760.0	30,696.0	183,704.0	3,031.0	8,153.0	2,673.0	16,086.0
Do	Hardwoods	2,262.0	1,911.0	10,561.0	193.0	476.0	166.0	924.0
Nevada	Softwoods	105.0	67.0	391.0	5.0	15.0	3.0	15.0
Do	Hardwoods	.0	.0	.0	.0	.0	.0	.0
New Mexico	Softwoods	42,846.0	36,137.0	225,934.0	4,396.0	14,366.0	334.0	2,087.0
Do	Hardwoods	500.0	196.0	1,286.0	55.0	179.0	4.0	26.0
Utah	Softwoods	11,839.0	10,992.0	64,608.0	787.0	1,763.0	428.0	2,644.0
Do	Hardwoods	278.0	263.0	358.0	40.0	31.0	22.0	46.0
Total	Softwoods	173,336.0	152,658.0	911,665.0	16,162.0	46,055.0	3,970.0	23,944.0
Do	Hardwoods	3,165.0	2,476.0	12,455.0	291.0	690.0	194.0	1,002.0
Total, Rocky Mountain	Softwoods	773,047.0	738,012.0	4,473,563.0	91,407.0	276,738.0	12,678.0	77,360.0
Do	Hardwoods	3,477.0	2,552.0	12,952.0	305.0	724.0	197.0	1,021.0
Total, all regions	Softwoods	9,518,264.0	8,851,911.0	47,062,015.0	812,858.0	2,277,134.0	381,315.0	1,507,564.0
Do	Hardwoods	3,297,104.0	2,835,497.0	11,490,244.0	585,311.0	1,155,945.0	762,100.0	1,683,088.0

Table 3.70—*Percent standard error for commercial timberland area and inventory volume in the United States, by section, region, and State*

Section, region and State	Commercial timberland area: Thousand acres (1977)	Percent standard error (year of inventory): Total	Percent standard error (year of inventory): at one million acres	Inventory volume: Million cubic feet (1977)	Percent standard error (year of inventory): Total	Percent standard error (year of inventory): at one billion cu. ft.	Date of field work	Year of inventory
New England:								
Connecticut	1,805.6	2.3	3.1	2,662.4	2.8	4.3	1971	1972
Maine	16,864.0	.4	1.6	22,603.7	.9	4.1	1968-1970	1971
Massachusetts	2,797.7	2.0	3.3	3,893.0	2.5	4.6	1971	1972
New Hampshire	4,692.0	.8	1.7	7,286.2	2.0	5.1	1972	1973
Rhode Island	395.3	3.1	1.9	412.0	5.1	3.0	1971	1972
Vermont	4,429.9	2.0	4.2	4,990.3	2.3	5.0	1972	1973
Total	30,984.5	.4	2.2	41,847.6	.7	4.5		
Middle Atlantic:								
Delaware	384.4	3.0	1.9	624.7	4.6	3.5	1971	1972
Maryland	2,522.7	1.7	2.7	3,492.1	2.3	4.3	1975-1976	1976
New Jersey	1,856.8	2.2	3.0	1,533.5	3.8	4.6	1971	1972
New York	14,243.3	.8	3.0	13,255.6	.9	3.1	1966-1968	1968
Pennsylvania	15,923.7	.5	2.0	23,402.8	1.3	5.5	1963-1965	1965
West Virginia	11,483.7	1.0	3.4	14,152.7	1.7	6.7	1973-1974	1975
Total	46,414.6	.6	4.2	56,461.4	.8	5.5		
Lake States:								
Michigan	18,778.2	.5	2.2	19,214.2	1.2	4.7	1964-1966	1966
Minnesota	13,695.1	.4	1.4	11,454.0	1.0	3.5	1974-1978	1977
North Dakota	405.0	2.9	1.9	257.4	3.2	1.6	1953-1954	1954
South Dakota	223.0	7.3	3.4	133.7	8.5	2.5	1964-1965	1965
Wisconsin	14,478.0	.4	1.4	13,457.4	.9	2.8	1967-1969	1968
Total	47,579.3	.2	1.6	44,516.7	.6	3.7		
Central States:								
Illinois	3,692.3	2.8	5.4	2,179.8	3.2	4.9	1961-1962	1962
Indiana	3,815.0	2.0	4.0	3,758.0	3.1	5.8	1966-1967	1967
Iowa	1,460.2	2.2	2.7	1,038.1	4.0	4.1	1973-1974	1974
Kansas	1,187.0	2.1	2.3	584.4	4.5	3.1	1964-1965	1965
Kentucky	11,901.9	.5	1.7	11,967.6	1.1	3.7	1973-1975	1975
Missouri	12,288.6	.8	2.7	6,021.9	1.5	3.8	1970-1973	1972
Nebraska	788.8	3.6	3.7	441.7	8.2	5.0	1953-1955	1955
Ohio	6,028.8	1.6	4.0	4,327.7	1.5	3.1	1966-1967	1968
Total	41,162.6	.5	3.2	30,319.2	.7	4.0		
Total, North	166,141.0	.2	2.6	173,144.9	.4	5.1		
South Atlantic:								
North Carolina	19,562.2	.2	1.1	26,130.7	1.1	5.5	1972-1975	1974
South Carolina	12,176.1	.5	1.8	14,200.6	1.5	5.2	1966-1968	1968
Virginia	15,938.8	.2	.9	19,656.5	1.1	4.8	1975-1977	1977
Total	47,677.1	.2	1.2	59,987.8	.7	5.4		
East Gulf:								
Florida	15,330.0	.5	2.0	11,732.7	1.8	5.8	1968-1970	1970
Georgia	24,812.3	.2	1.0	28,401.7	1.0	5.2	1970-1972	1972
Total	40,142.3	.2	1.5	40,134.4	.9	5.6		
Central Gulf:								
Alabama	21,333.1	.2	.9	22,239.8	1.2	5.4	1971-1972	1972
Mississippi	16,504.3	.3	1.9	17,233.7	1.4	5.8	1976-1977	1977
Tennessee	12,819.8	.3	1.1	12,503.9	1.7	5.5	1970-1971	1971
Total	50,657.2	.1	.7	51,977.4	.8	5.3		
West Gulf:								
Arkansas	18,206.7	.3	1.3	17,145.2	1.3	5.1	1967-1970	1969
Louisiana	14,526.6	.3	1.1	17,430.9	1.5	6.1	1972-1974	1974
Oklahoma	4,323.4	.7	1.4	2,061.5	3.4	4.9	1976	1976
Texas	12,512.5	.3	1.1	13,272.1	1.6	5.7	1974-1976	1975
Total	49,569.2	.2	1.4	49,909.7	.8	5.5		
Total, South	188,045.8	.1	1.3	202,009.3	.4	5.7		

Table 3.70—*Percent standard error for commercial timberland area and inventory volume in the United States, by section, region, and State—Cont'd.*

Section, region and State	Commercial timberland area			Inventory volume			Date of field work	Year of inventory
	Thousand acres (1977)	Percent standard error (year of inventory)		Million cubic feet (1977)	Percent standard error (year of inventory)			
		Total	at one million acres		Total	at one billion cu. ft.		
Pacific Northwest:								
Alaska:								
Coastal	7,040.2	1.1	3.0	38,573.5	1.6	9.7	1970-1975	1972
Interior	4,109.9	1.2	2.4	4,499.2	4.0	8.4	1966-1973	1970
Summary	11,150.1	.8	2.8	43,072.7	1.5	9.6		
Oregon:								
Eastern	10,560.0	.7	2.2	22,157.0	1.5	7.1	1964-1972	1965-1972
Western	13,651.0	.7	2.5	57,397.0	1.4	10.8	1961-1975	1963-1976
Summary	24,211.0	.5	2.4	79,554.0	1.1	9.9		
Washington:								
Eastern	8,134.0	.9	2.5	16,889.0	1.4	5.7	1964-1968	1968-1972
Western	9,788.0	.6	1.8	46,614.0	1.3	8.5	1963-1969	1964-1970
Summary	17,922.0	.5	2.1	63,503.0	1.0	7.9		
Total	53,283.1	.3	2.3	186,129.7	.9	10.4		
Pacific Southwest:								
California	16,303.0	.8	3.2	49,668.0	2.0	14.1	1958-1978	1972-1978
Hawaii	948.0	2.8	2.7	202.0	14.1	6.3	1969-1970	1970
Total	17,251.0	.8	3.2	49,870.0	2.0	14.1		
Total, Pacific Coast	70,534.1	.3	2.5	235,999.7	.8	12.3		
Northern Rocky Mountain:								
Idaho	13,540.6	.9	3.3	31,883.7	1.3	7.3	1961-1964, 1967	1967
Montana	14,359.4	.7	2.7	27,977.1	1.9	10.1	1953-1958, 1966	1966
South Dakota (West)	1,244.1	2.2	2.5	1,643.0	3.4	4.3	1970-1973	1973
Wyoming	4,334.2	.7	1.5	7,194.7	2.7	7.2	1957-1958	1958
Total	33,478.3	.5	2.9	68,698.5	.5	4.1		
Southern Rocky Mountain:								
Arizona	3,895.6	1.5	3.0	4,982.2	4.0	8.9	1962	1962
Colorado	11,314.7	.3	1.0	15,035.9	1.8	7.0	1956-1959	1959
Nevada	134.3	5.5	2.0	262.3	8.3	4.5	1968	1968
New Mexico	5,537.5	1.2	2.8	6,395.2	3.7	9.4	1962	1962
Utah	3,404.6	.7	1.3	4,439.9	2.5	5.2	1961	1961
Total	24,286.7	.4	2.0	31,115.5	.4	2.2		
Total, Rocky Mountain	57,765.0	.3	2.3	99,814.0	.4	4.0		
Total, all regions	482,485.9	.1	2.2	710,967.9	.3	8.0		

Appendix 4

Timber Resource Projections—Methodology and Supporting Detailed Tables

Appendix 4. Timber Resource Projections—Methodology and Supporting Detailed Tables

The Projection Model Used

The model used in projecting changes in the timber resource has two major parts—one simulates changes in timber inventory and the other estimates roundwood harvest (fig. 4.1). The two parts are tied together by two fundamental relationships: annual roundwood harvest is a reduction in timber inventory, which in turn affects the rate of growth of inventory, and the character of the timber inventory each year in part determines the volume and character of the roundwood harvest.

A timber stand table simulator is at the center of the inventory segment of the projection model.[1] The timber resource is represented as an aggregate or average stand table, which depicts the timber inventory by region or ownership category, as a stand of trees separated into 2-inch diameter classes. The aggregate stand is divided into softwood and hardwood components. The two components are projected separately. The total stand basal area is assumed to change in proportion to the basal area of the projected component. The mortality and radial growth constraint relationships used this total stand basal area estimate.

Inventory change is simulated annually by changes in the number of trees in the stand table and the acreage of commercial timberland. The potential increase in the number of trees in each diameter class is based on radial tree growth rates estimated for each diameter class and on the rate at which small trees grow into the smallest merchantable diameter class (ingrowth). The ingrowth rate is particularly influenced by the growth of young plantations and by natural regeneration following harvest. Mortality is calculated by applying estimated mortality rates for each diameter class to the number of trees in that class. Total gross growth less mortality determines net growth.

The radial growth and mortality rates were derived from Forest Survey inventory plots located throughout the country, on which measurements were taken generally in the late 1960's and the first half of the 1970's. Radial growth and mortality by diameter class were changed in response to changes in stand density.

Total removals from timber inventory are allocated among diameter classes on the basis of estimated removal rates compiled from the same inventory data as the radial growth and mortality rates in the East and from special studies in the West. Together, net growth and removals are used to estimate the net change in the number of trees by diameter class during the year, thus providing an estimate of the inventory at the beginning of the next year.

The roundwood supply equation—the harvest part of the projection model—describes the functional relationship between annual roundwood harvest and several major harvest determinants, including stumpage prices, total growing stock inventory, the board foot/cubic foot ratio of the inventory, and growth as a percentage of the timber inventory. Separate roundwood supply equations were fitted to historical data, generally for the years 1950 to 1974, by standard regression techniques for each projection component. For example, a roundwood supply equation was derived for softwoods and hardwoods for each major ownership category and timber supply region used in this study. Not all variables were used in each equation; the choice was based on standard statistical tests and the reasonableness of test projection results.[2]

The roundwood supply equations have a major impact on projection results. This is particularly true of the responsiveness of the estimated roundwood supply to changes in inventory levels and stumpage prices. Although there is variation among equations, roundwood supply appears to be quite inelastic with respect to stumpage prices, at least over the timber period represented by the historical data. A 1 percent increase in stumpage prices only brings about a 0.1 to 0.4 percent increase in roundwood supplies.[3] Supply elasticities are generally greater where large timber inventories exist, and the markets are limited such as for hardwoods in the North. The price elasticities are lower in areas where inventories have been declining and there is strong competition for the available supplies such as for softwoods in the Pacific Northwest.

The projections of timber supplies on public lands were not allowed to rise above the harvest ceilings established in the existing management plan. Harvests on these lands are controlled by law and administrative regulation, and once harvest ceilings are reached, do not respond to changes in stumpage prices, inventory levels, and the other determinants which influence harvests on private lands. These ceilings constrain in a significant way the softwood supply projections on National Forest lands on the Pacific Coast and in the South and on other public lands in the West.

After the roundwood supply projections are quantified, they are converted to removals from growing stock. This involves estimating supply of roundwood from nongrowing stock sources, the amount of logging residues left after harvest operations, and the amount of other removals that are not associated with harvest operations. Withdrawal of commercial timberland to be placed in reserved status is a major factor in the latter calculation. The resulting estimate of growing stock removals is allocated among the diameter classes of the stand table in the inventory segment of the model using the

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[1] Larson, Robert W., and Marcus H. Goforth. TRAS: a computer program for the projection of timber volume. U.S. Dep. Agric., Forest Serv., Agric. Handb. 377, 23 p. 1970.
——— TRAS: a timber volume projection model. U.S. Dep. Agric., Forest Serv., Tech. Bull. 1508, 15 p. 1974.

[2] The method used here is an empirical formulation of a similar assumption in the *Outlook* study and is similar to the approach used by Adams:

United States Department of Agriculture, Forest Service. The outlook for timber in the United States. Forest Res. Rep. 20, Govt. Print. Off., Washington, D.C., 367 p. 1973.

Adams, Darius M. Effects of National Forest timber harvest on softwood stumpage, lumber, and plywood markets: an econometric analysis. Oregon State Univ., Res. Bull. 15. Corvallis, Oreg. 50 p. 1977.

[3] These stumpage price supply elasticity estimates are similar to those derived by:

Ibid.

Robinson, Vernon L. An econometric model of softwood lumber and stumpage markets. 1947–1967. Forest Sci. 20(2): 171–179, 194. 1974.

removal rates estimated for each diameter class. This completes the loop and makes it possible to recursively project changes in various measures of the timber resource and specifically in this study timber supplies, inventories, and net annual growth.

Other Alternative Models

Several other projection models were studied before the model used in this study was selected.[4] The most promising alternative divides the timber resource into an array of cells, each of which describes an area of forest land that is distinguished by factors indicating its availability and suitability for timber harvest. Factors such as site class, species, stand age, accessibility, and nontimber impacts associated with timber harvesting are dimensions that can be used to describe the area in each cell. The effects of timber harvesting and growth can be registered in the model by shifting acres among the various cells as the assumed harvest or timber growth affects the character of the area.

That approach is much different from that used in this report. The model used here aggregates all areas in a single stand table for each species group, each ownership and region that shows the number of trees by 2-inch diameter classes. Although in some ways conceptually superior to the approach used in this report, an approach based on area classes requires much more data, including detailed trend information on resource changes. With more manpower and the ever-improving resource data base, it may be possible to use an approach based on area classes in future national timber supply analyses.

Other alternative models that were studied were not compatible with the major projection objective of this study, i.e., the projection of changes in the timber resource under a continuation of recent resource and owner behavior patterns. Most of the others were normative models, designed to identify "desirable" actions based on financial decision rules rather than "likely" outcomes. Such models are useful in long-term planning for most owners of commercial forest land. However, commercial timberland is owned by dozens of large and small public agencies and millions of private owners. Many of these owners are motivated by nontimber management goals and nonfinancial concerns. The financially oriented normative models often do not estimate actual behavior very accurately. To sidestep the question of actual behavior under a continuation of recent activity in favor of a normative analysis alone would be bypassing an objective of this study.

[4] Some of the alternative timber supply projection models evaluated include those presented in the following studies:

Beauter, John N., K. Norman Johnson, and H. Lynn Scheurman. Timber for Oregon's tomorrow, an analysis of reasonable possible occurrences. Oregon State Univ., Res. Bull. 19, Corvallis, Oreg., 111 p. 1976.

Navon, Daniel I. Timber RAM: a long-range planning method for commercial timberlands under multiple-use management. U.S. Dep. Agric., Forest Serv., Res. Pap. PSW-70, 22 p. 1971.

Clawson, Marion and William F. Hyde. Managing the forests of the Coastal Pacific Northwest for maximum social returns. *In* Timber policy issues in British Columbia. Ed. by William McKillop and Walter J. Mead. Univ. British Columbia Press, Vancouver, B.C., p. 171–206. 1976.

Vaux, Henry J. Economics of the young-growth sugar pine resource. Calif. Agric. Exp. Sta. Bull. 738, 56 p. 1954.

Figure 4.1.—Schematic representation of the timber supply projection model.

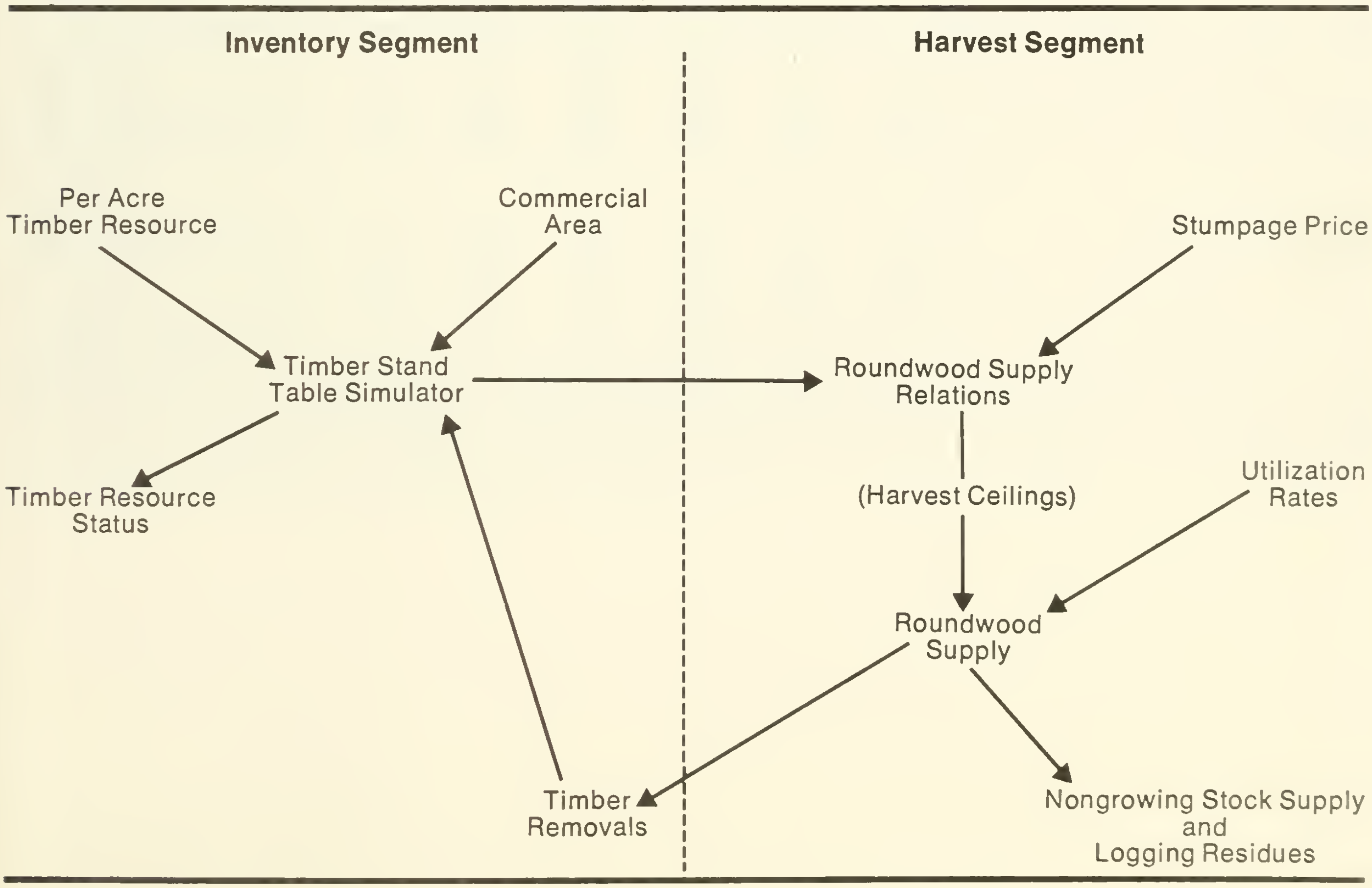

Table 4.1—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the Northeast, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock	473	375	413	499	547	592	633	654	674
Net annual growth	653	822	902	1,067	1,099	1,029	939	859	799
Mortality	151	180	207	191	238	267	286	297	302
Roundwood supplies[1]	447	353	382	462	527	574	612	642	666
Inventory of growing stock[2]	20,027	24,030	27,876	30,989	38,686	43,712	47,452	50,085	51,759
HARDWOODS									
Removals from growing stock	504	595	738	804	801	939	1,071	1,159	1,226
Net annual growth	1,358	1,722	1,973	2,072	1,952	1,674	1,446	1,316	1,249
Mortality	248	301	357	357	454	501	523	525	526
Roundwood supplies[1]	480	518	560	596	734	884	1,015	1,142	1,243
Inventory of growing stock[2]	43,198	52,833	60,272	67,319	85,393	95,119	100,775	103,622	104,608

[1]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[2]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.2—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the Northeast, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber	1,333	946	1,475	1,622	1,257	1,397	1,558	1,688	1,824
Net annual growth	1,412	1,597	2,094	2,398	2,487	2,639	2,738	2,799	2,827
Mortality	242	273	353	295	367	425	481	534	582
Sawtimber supplies[1]	1,358	946	1,481	1,565	1,271	1,411	1,556	1,703	1,849
Inventory of sawtimber[2]	40,583	45,958	53,793	60,893	75,513	87,382	99,060	110,296	120,597
HARDWOODS									
Removals from sawtimber	1,459	1,566	2,609	2,393	1,680	2,025	2,385	2,668	2,922
Net annual growth	2,640	3,275	3,989	3,964	4,005	3,940	3,841	3,804	3,806
Mortality	329	375	458	432	548	621	677	723	757
Sawtimber supplies[1]	1,298	1,407	2,246	2,330	1,676	2,055	2,409	2,778	3,102
Inventory of sawtimber[2]	84,021	92,852	104,543	116,571	147,839	168,296	184,289	196,686	206,113

[1]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[2]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.3—*Roundwood supplies, net annual growth, and growing stock inventory in the Northeast, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	3	3	3	2	5	7	8	8	8
Net annual growth	13	15	16	18	17	16	14	12	11
Inventory	459	533	635	636	808	929	1,022	1,097	1,144
Hardwoods									
Roundwood supplies	9	9	15	21	30	36	41	45	47
Net annual growth	69	88	105	117	97	76	63	58	55
Inventory	1,984	2,580	3,007	3,749	4,772	5,407	5,827	6,136	6,303
Other public									
Softwoods									
Roundwood supplies	7	5	7	13	23	29	33	37	40
Net annual growth	27	32	37	49	48	43	40	38	37
Inventory	886	1,042	1,274	1,554	1,962	2,148	2,248	2,303	2,318
Hardwoods									
Roundwood supplies	23	26	28	23	31	36	39	42	44
Net annual growth	142	182	210	238	188	126	93	81	74
Inventory	3,803	4,838	5,695	6,479	9,049	10,207	10,841	11,316	11,687
Forest industry									
Softwoods									
Roundwood supplies	99	87	128	168	186	199	210	219	227
Net annual growth	179	236	339	377	389	367	337	311	288
Inventory	5,245	6,426	9,752	10,825	13,599	15,469	16,943	18,089	18,882
Hardwoods									
Roundwood supplies	44	45	69	89	99	118	134	150	162
Net annual growth	129	156	193	226	215	187	166	153	148
Inventory	4,741	5,553	6,818	7,636	9,489	10,424	10,935	11,161	11,190
Farmer and other private									
Softwoods									
Roundwood supplies	338	258	244	278	313	339	360	377	391
Net annual growth	433	539	510	623	645	603	548	498	462
Inventory	13,437	16,029	16,215	17,974	22,317	25,166	27,240	28,597	29,415
Hardwoods									
Roundwood supplies	404	438	448	462	574	694	801	906	990
Net annual growth	1,018	1,296	1,465	1,492	1,453	1,286	1,124	1,025	971
Inventory	32,670	39,862	44,752	49,455	62,083	69,081	73,173	75,009	75,428
Total Northeast									
Softwoods									
Roundwood supplies	447	353	382	462	527	574	612	642	666
Net annual growth	653	822	902	1,067	1,099	1,029	939	859	799
Inventory	20,027	24,030	27,876	30,989	38,686	43,712	47,452	50,085	51,759
Hardwoods									
Roundwood supplies	480	518	560	596	734	884	1,015	1,142	1,243
Net annual growth	1,358	1,722	1,973	2,072	1,952	1,674	1,446	1,316	1,249
Inventory	43,198	52,833	60,272	67,319	85,393	95,119	100,775	103,622	104,608

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.4—*Sawtimber supplies, net annual growth, and sawtimber inventory in the Northeast, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	10	9	11	9	17	23	26	26	27
Net annual growth	40	45	47	54	52	51	50	49	48
Inventory	1,216	1,298	1,556	1,641	2,108	2,474	2,795	3,099	3,346
Hardwoods									
Sawtimber supplies	23	24	63	68	79	97	113	127	137
Net annual growth	136	172	209	258	232	218	211	212	215
Inventory	4,385	4,965	5,863	7,402	9,489	11,074	12,418	13,646	14,625
Other public									
Softwoods									
Sawtimber supplies	19	15	30	43	59	76	89	102	113
Net annual growth	60	63	74	120	116	121	123	126	128
Inventory	1,843	2,074	2,433	3,163	4,025	4,524	4,918	5,261	5,524
Hardwoods									
Sawtimber supplies	54	66	111	96	67	82	95	107	120
Net annual growth	224	288	344	401	395	358	341	341	346
Inventory	6,107	7,328	8,502	10,067	14,506	17,407	19,880	22,314	24,690
Forest industry									
Softwoods									
Sawtimber supplies	286	219	462	546	367	398	436	478	522
Net annual growth	334	396	692	645	704	756	810	842	872
Inventory	9,752	11,204	15,760	17,066	21,152	24,604	28,204	31,959	35,621
Hardwoods									
Sawtimber supplies	101	105	255	376	250	303	349	399	440
Net annual growth	236	272	422	412	494	483	468	462	459
Inventory	9,359	10,062	12,910	14,752	18,348	20,483	22,021	23,093	23,761
Farmer and other private									
Softwoods									
Sawtimber supplies	1,043	702	978	968	829	915	1,005	1,097	1,187
Net annual growth	978	1,092	1,281	1,577	1,615	1,711	1,763	1,782	1,779
Inventory	27,772	31,382	34,044	39,023	48,229	55,781	63,143	69,978	76,106
Hardwoods									
Sawtimber supplies	1,120	1,212	1,817	1,789	1,281	1,574	1,852	2,146	2,405
Net annual growth	2,044	2,543	3,013	2,892	2,884	2,881	2,821	2,789	2,786
Inventory	64,170	70,497	77,268	84,350	105,497	119,332	129,969	137,633	143,037
Total Northeast									
Softwoods									
Sawtimber supplies	1,358	946	1,481	1,565	1,271	1,411	1,556	1,703	1,849
Net annual growth	1,412	1,597	2,094	2,398	2,487	2,639	2,738	2,799	2,827
Inventory	40,583	45,958	53,793	60,893	75,513	87,382	99,060	110,296	120,597
Hardwoods									
Sawtimber supplies	1,298	1,407	2,246	2,330	1,676	2,055	2,409	2,778	3,102
Net annual growth	2,640	3,275	3,989	3,964	4,005	3,940	3,841	3,804	3,806
Inventory	84,021	92,852	104,543	116,571	147,839	168,296	184,289	196,686	206,113

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.5—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the North Central, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock	162	165	184	207	309	365	392	417	414
Net annual growth	340	412	460	533	623	631	616	592	576
Mortality	66	115	126	137	184	214	239	257	272
Roundwood supplies[1]	149	148	167	174	293	347	382	408	428
Inventory of growing stock[2]	7,602	10,302	11,785	13,585	18,310	21,357	23,973	26,026	27,917
HARDWOODS									
Removals from growing stock	975	943	1,138	1,150	1,412	1,649	1,840	2,069	2,100
Net annual growth	1,634	1,785	1,953	2,119	2,352	2,289	2,177	2,071	2,033
Mortality	269	392	464	534	679	753	803	820	822
Roundwood supplies[1]	901	811	905	906	1,290	1,539	1,790	2,076	2,266
Inventory of growing stock[2]	40,447	50,238	55,929	61,251	76,602	84,903	90,299	92,175	92,593

[1]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.

[2]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.6—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the North Central, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber	481	493	546	601	952	1,123	1,228	1,344	1,371
Net annual growth	925	1,323	1,404	1,679	1,750	1,940	2,107	2,241	2,370
Mortality	123	222	250	287	403	469	539	609	686
Sawtimber supplies[1]	488	484	552	604	949	1,114	1,236	1,351	1,460
Inventory of sawtimber[2]	18,173	23,918	29,084	35,608	47,012	55,030	63,587	72,297	82,052
HARDWOODS									
Removals from sawtimber	3,147	3,366	3,991	3,797	3,832	4,484	5,007	5,693	5,809
Net annual growth	4,185	5,080	5,428	5,845	5,930	6,110	6,211	6,234	6,275
Mortality	605	890	946	1,071	1,268	1,395	1,492	1,548	1,584
Sawtimber supplies[1]	2,792	3,006	3,615	3,858	3,803	4,494	5,194	6,029	6,572
Inventory of sawtimber[2]	105,851	119,425	132,241	145,944	178,265	194,951	207,657	214,283	218,571

[1]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.

[2]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.7—*Roundwood supplies, net annual growth, and growing stock inventory in the North Central, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	24	28	34	32	43	51	59	66	68
Net annual growth	62	80	82	104	135	151	159	161	161
Inventory	1,494	2,168	2,397	2,562	3,634	4,635	5,665	6,676	7,661
Hardwoods									
Roundwood supplies	32	34	40	43	47	50	53	56	58
Net annual growth	123	155	156	179	212	206	179	149	126
Inventory	2,796	3,938	4,464	4,901	6,904	8,602	10,061	11,220	12,094
Other public									
Softwoods									
Roundwood supplies	33	35	38	41	122	147	153	155	155
Net annual growth	95	123	130	141	152	151	150	149	148
Inventory	2,239	3,032	3,346	3,616	4,657	4,834	4,872	4,873	4,863
Hardwoods									
Roundwood supplies	45	51	70	72	88	103	119	135	151
Net annual growth	222	281	290	319	312	258	215	191	179
Inventory	4,877	6,979	7,992	8,986	12,212	14,180	15,503	16,341	16,862
Forest industry									
Softwoods									
Roundwood supplies	30	22	25	28	34	39	44	49	53
Net annual growth	44	44	63	55	66	70	72	71	71
Inventory	927	1,325	1,536	1,787	2,342	2,764	3,172	3,474	3,768
Hardwoods									
Roundwood supplies	73	41	57	55	99	127	157	188	209
Net annual growth	105	108	127	126	156	164	168	168	171
Inventory	2,219	2,914	3,408	3,739	5,018	5,716	6,215	6,329	6,317
Farmer and other private									
Softwoods									
Roundwood supplies	62	63	70	74	94	111	126	139	151
Net annual growth	140	165	185	231	269	259	236	212	197
Inventory	2,942	3,777	4,506	5,620	7,677	9,123	10,265	11,003	11,625
Hardwoods									
Roundwood supplies	751	685	738	737	1,057	1,258	1,461	1,696	1,848
Net annual growth	1,182	1,242	1,380	1,495	1,672	1,660	1,615	1,563	1,558
Inventory	30,555	36,407	40,065	43,624	52,467	56,405	58,521	58,286	57,319
Total North Central									
Softwoods									
Roundwood supplies	149	148	167	174	293	347	382	408	428
Net annual growth	340	412	460	533	623	631	616	592	576
Inventory	7,602	10,302	11,785	13,585	18,310	21,357	23,973	26,026	27,917
Hardwoods									
Roundwood supplies	901	811	905	906	1,290	1,539	1,790	2,076	2,266
Net annual growth	1,634	1,785	1,953	2,119	2,352	2,289	2,177	2,071	2,033
Inventory	40,447	50,238	55,929	61,251	76,602	84,903	90,299	92,175	92,593

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.8—*Sawtimber supplies, net annual growth, and sawtimber inventory in the North Central, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	80	83	125	141	138	165	197	233	257
Net annual growth	138	202	232	312	356	445	544	646	745
Inventory	2,625	3,916	4,992	6,408	8,833	11,381	14,554	18,412	23,029
Hardwoods									
Sawtimber supplies	83	114	130	230	107	118	131	146	162
Net annual growth	239	335	322	431	425	473	494	502	508
Inventory	4,031	5,819	7,071	8,948	12,576	16,058	19,727	23,461	27,147
Other public									
Softwoods									
Sawtimber supplies	91	96	101	131	372	432	439	433	426
Net annual growth	260	396	369	425	396	396	394	392	389
Inventory	5,135	6,522	7,592	8,779	10,966	10,910	10,607	10,324	10,098
Hardwoods									
Sawtimber supplies	96	126	177	227	218	266	324	388	455
Net annual growth	429	685	684	788	731	740	746	762	781
Inventory	9,054	12,347	15,014	17,200	23,779	28,821	33,461	37,674	41,499
Forest industry									
Softwoods									
Sawtimber supplies	112	81	95	112	129	148	170	192	217
Net annual growth	122	157	226	200	230	262	291	309	325
Inventory	2,705	3,879	4,664	5,668	7,379	8,771	10,292	11,650	13,115
Hardwoods									
Sawtimber supplies	175	153	195	236	302	383	469	561	623
Net annual growth	249	351	397	367	421	459	491	503	512
Inventory	5,783	7,216	8,542	9,415	12,453	13,988	15,129	15,391	15,319
Farmer and other private									
Softwoods									
Sawtimber supplies	203	224	230	220	310	368	430	493	560
Net annual growth	404	568	576	742	768	837	878	895	912
Inventory	7,708	9,601	11,836	14,753	19,834	23,968	28,133	31,912	35,809
Hardwoods									
Sawtimber supplies	2,438	2,613	3,113	3,165	3,177	3,726	4,269	4,934	5,332
Net annual growth	3,268	3,709	4,025	4,260	4,353	4,438	4,479	4,467	4,474
Inventory	86,983	94,043	101,614	110,381	129,457	136,084	139,341	137,757	134,606
Total North Central									
Softwoods									
Sawtimber supplies	488	484	552	604	949	1,114	1,236	1,351	1,460
Net annual growth	925	1,323	1,404	1,679	1,750	1,940	2,107	2,241	2,370
Inventory	18,173	23,918	29,084	35,608	47,012	55,030	63,587	72,297	82,052
Hardwoods									
Sawtimber supplies	2,792	3,006	3,615	3,858	3,803	4,494	5,194	6,029	6,572
Net annual growth	4,185	5,080	5,428	5,845	5,930	6,110	6,211	6,234	6,275
Inventory	105,851	119,425	132,241	145,944	178,265	194,951	207,657	214,283	218,571

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.9—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the Southeast, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock	1,835	1,569	1,799	2,029	2,366	2,625	2,794	2,891	2,961
Net annual growth	1,874	2,152	2,678	2,987	3,338	3,352	3,284	3,188	3,085
Mortality	235	260	259	300	381	424	445	452	451
Roundwood supplies[1]	1,797	1,512	1,686	1,853	2,257	2,527	2,713	2,835	2,906
Inventory of growing stock[2]	33,825	36,939	42,325	47,738	61,553	70,362	76,668	80,688	82,838
HARDWOODS									
Removals from growing stock	1,014	1,052	1,059	1,003	1,319	1,609	1,859	2,097	2,257
Net annual growth	1,292	1,468	1,832	2,087	2,194	2,103	1,986	1,911	1,869
Mortality	284	301	261	287	366	410	423	427	411
Roundwood supplies[1]	765	639	710	733	1,126	1,434	1,721	2,009	2,225
Inventory of growing stock[2]	37,621	40,855	46,219	52,385	66,469	73,717	76,953	76,946	74,147

[1]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volumes that would be harvested given the assumptions of the study.
[2]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.10—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the Southeast, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber	6,722	5,767	6,452	7,398	8,372	9,574	10,633	11,495	12,235
Net annual growth	6,536	7,666	8,993	10,495	12,163	13,287	14,001	14,282	14,225
Mortality	564	545	592	693	921	1,096	1,257	1,392	1,494
Sawtimber supplies[1]	6,419	5,441	6,162	6,627	8,091	9,323	10,429	11,377	12,119
Inventory of sawtimber[2]	103,310	112,744	130,541	148,396	195,694	233,227	268,728	299,305	322,846
HARDWOODS									
Removals from sawtimber	3,287	2,972	2,942	3,253	3,914	4,843	5,696	6,535	7,106
Net annual growth	3,515	4,045	5,240	6,466	6,589	6,721	6,666	6,563	6,367
Mortality	781	796	695	750	975	1,115	1,194	1,224	1,200
Sawtimber supplies[1]	3,058	2,483	2,232	2,457	3,501	4,510	5,490	6,489	7,230
Inventory of sawtimber[2]	100,018	105,684	120,521	135,484	173,830	196,275	209,376	213,562	208,655

[1]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study.
[2]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.11—*Roundwood supplies, net annual growth, and growing stock inventory in the Southeast, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	14	27	33	61	61	67	73	82	91
Net annual growth	80	90	124	135	136	130	122	115	110
Inventory	1,991	2,132	2,494	2,851	3,655	4,367	4,947	5,381	5,665
Hardwoods									
Roundwood supplies	9	11	17	15	25	36	50	65	79
Net annual growth	73	86	118	134	125	112	101	96	95
Inventory	2,480	2,881	3,396	4,030	5,244	6,148	6,792	7,215	7,472
Other public									
Softwoods									
Roundwood supplies	51	43	66	72	72	72	72	72	73
Net annual growth	70	84	121	135	166	172	165	150	135
Inventory	1,506	1,870	2,092	2,382	3,455	4,427	5,395	6,255	6,956
Hardwoods									
Roundwood supplies	12	10	19	25	34	42	50	58	64
Net annual growth	27	32	52	60	68	68	63	57	49
Inventory	766	1,006	1,334	1,554	2,028	2,315	2,504	2,567	2,501
Forest industry									
Softwoods									
Roundwood supplies	318	252	430	473	526	579	630	672	706
Net annual growth	375	411	541	607	723	772	791	791	785
Inventory	6,470	7,112	8,031	8,802	11,082	13,202	15,136	16,653	17,792
Hardwoods									
Roundwood supplies	127	96	108	107	165	206	245	292	329
Net annual growth	171	174	218	244	272	283	282	286	284
Inventory	5,149	5,482	6,372	6,825	8,375	9,325	9,814	10,135	9,981
Farmer and other private									
Softwoods									
Roundwood supplies	1,414	1,189	1,157	1,247	1,597	1,808	1,939	2,009	2,036
Net annual growth	1,349	1,567	1,893	2,111	2,314	2,278	2,207	2,132	2,055
Inventory	23,858	25,825	29,708	33,703	43,360	48,366	51,191	52,399	52,426
Hardwoods									
Roundwood supplies	617	523	566	586	902	1,150	1,376	1,595	1,754
Net annual growth	1,020	1,175	1,445	1,649	1,729	1,641	1,540	1,473	1,442
Inventory	29,226	31,486	35,117	39,976	50,822	55,930	57,843	57,029	54,194
Total Southeast									
Softwoods									
Roundwood supplies	1,797	1,512	1,686	1,853	2,257	2,527	2,713	2,835	2,906
Net annual growth	1,874	2,152	2,678	2,987	3,338	3,352	3,284	3,188	3,085
Inventory	33,825	36,939	42,325	47,738	61,553	70,362	76,668	80,688	82,838
Hardwoods									
Roundwood supplies	765	639	710	733	1,126	1,434	1,721	2,009	2,225
Net annual growth	1,292	1,468	1,832	2,087	2,194	2,103	1,986	1,911	1,869
Inventory	37,621	40,855	46,219	52,385	66,469	73,717	76,953	76,946	74,147

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.12—*Sawtimber supplies, net annual growth, and sawtimber inventory in the Southeast, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	135	107	137	192	247	283	319	374	431
Net annual growth	314	353	469	527	584	622	636	636	631
Inventory	6,072	7,135	8,618	9,969	13,364	16,821	20,190	23,196	25,630
Hardwoods									
Sawtimber supplies	59	70	81	54	82	126	180	239	301
Net annual growth	180	223	347	444	429	434	432	439	453
Inventory	6,638	7,840	9,455	10,985	14,883	18,209	21,051	23,369	25,225
Other public									
Softwoods									
Sawtimber supplies	189	167	256	272	284	295	311	328	344
Net annual growth	250	321	471	547	676	781	830	821	774
Inventory	5,428	6,469	7,119	8,124	12,262	16,607	21,629	26,717	31,359
Hardwoods									
Sawtimber supplies	36	29	56	84	109	138	173	213	251
Net annual growth	66	82	148	183	218	250	276	286	271
Inventory	2,034	2,603	3,567	4,142	5,496	6,536	7,578	8,476	9,021
Forest industry									
Softwoods									
Sawtimber supplies	1,210	980	1,577	1,690	1,764	1,965	2,217	2,485	2,743
Net annual growth	1,303	1,458	1,714	1,933	2,331	2,682	3,000	3,227	3,369
Inventory	20,489	22,168	24,126	25,912	31,917	38,716	46,688	54,742	62,189
Hardwoods									
Sawtimber supplies	521	386	340	339	521	651	773	922	1,038
Net annual growth	467	466	630	726	805	867	891	911	900
Inventory	14,986	14,803	17,036	17,995	22,055	24,631	26,074	27,055	26,628
Farmer and other private									
Softwoods									
Sawtimber supplies	4,886	4,187	4,193	4,473	5,796	6,780	7,581	8,190	8,601
Net annual growth	4,669	5,533	6,339	7,488	8,573	9,202	9,535	9,599	9,452
Inventory	71,321	76,972	90,679	104,391	138,150	161,083	180,222	194,650	203,668
Hardwoods									
Sawtimber supplies	2,442	1,998	1,755	1,980	2,790	3,596	4,364	5,116	5,640
Net annual growth	2,802	3,275	4,116	5,113	5,137	5,171	5,066	4,927	4,743
Inventory	76,360	80,438	90,465	102,362	131,395	146,899	154,673	154,662	147,781
Total Southeast									
Softwoods									
Sawtimber supplies	6,419	5,441	6,162	6,627	8,091	9,323	10,429	11,377	12,119
Net annual growth	6,536	7,666	8,993	10,495	12,163	13,287	14,001	14,282	14,225
Inventory	103,310	112,744	130,541	148,396	195,694	233,227	268,728	299,305	322,846
Hardwoods									
Sawtimber supplies	3,058	2,483	2,232	2,457	3,501	4,510	5,490	6,489	7,230
Net annual growth	3,515	4,045	5,240	6,466	6,589	6,721	6,666	6,563	6,367
Inventory	100,018	105,684	120,521	135,484	173,830	196,275	209,376	213,562	208,655

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.13—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the South Central, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock	1,277	1,243	1,969	2,442	2,858	3,001	3,141	3,236	3,342
Net annual growth	1,751	2,528	2,927	3,171	3,382	3,448	3,448	3,437	3,403
Mortality	97	137	166	212	243	263	277	286	291
Roundwood supplies[1]	1,251	1,197	1,845	2,381	2,630	2,866	3,061	3,218	3,323
Inventory of growing stock[2]	24,421	34,615	42,571	49,398	58,280	64,337	68,717	71,778	73,282
HARDWOODS									
Removals from growing stock	1,549	1,661	1,674	1,098	1,977	2,282	2,543	2,804	2,954
Net annual growth	1,531	1,665	2,138	2,460	2,529	2,460	2,375	2,314	2,250
Mortality	337	448	291	322	393	422	426	408	374
Roundwood supplies[1]	1,169	1,009	1,123	959	1,606	2,032	2,396	2,764	2,987
Inventory of growing stock[2]	40,617	43,631	45,704	52,489	64,057	69,103	69,886	67,178	61,403

[1]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volumes that would be harvested given the assumptions of the study.
[2]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.14—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the South Central, by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber	5,159	5,124	8,442	11,540	12,084	12,949	13,826	14,487	15,142
Net annual growth	7,102	10,315	12,143	13,672	14,835	15,535	15,826	15,941	15,850
Mortality	319	478	478	619	776	879	959	1,020	1,059
Sawtimber supplies[1]	4,923	4,834	8,063	11,358	11,313	12,544	13,639	14,557	15,208
Inventory of sawtimber[2]	93,245	132,969	165,264	192,627	231,466	262,083	286,465	304,842	315,429
HARDWOODS									
Removals from sawtimber	4,982	4,570	5,262	4,445	6,210	7,430	8,458	9,376	9,713
Net annual growth	4,239	4,329	5,545	6,830	8,703	8,870	8,603	8,107	7,365
Mortality	962	1,304	753	865	1,058	1,204	1,258	1,215	1,097
Sawtimber supplies[1]	4,634	3,818	3,992	3,879	5,297	6,931	8,314	9,595	10,151
Inventory of sawtimber[2]	112,617	113,697	118,269	138,202	178,567	200,789	208,653	202,182	182,032

[1]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volumes that would be harvested given the assumptions of the study.
[2]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.15—*Roundwood supplies, net annual growth, and growing stock inventory in the South Central, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	141	90	147	174	161	194	231	264	290
Net annual growth	207	331	308	239	251	251	247	242	238
Inventory	2,983	4,733	4,740	5,374	6,597	7,369	7,786	7,822	7,536
Hardwoods									
Roundwood supplies	41	29	32	18	25	32	38	43	47
Net annual growth	56	97	106	123	116	91	70	59	55
Inventory	1,470	2,345	2,448	2,993	4,222	4,985	5,440	5,686	5,825
Other public									
Softwoods									
Roundwood supplies	42	31	40	50	49	51	53	54	54
Net annual growth	54	55	75	71	82	87	87	84	79
Inventory	717	752	1,130	1,356	1,793	2,196	2,600	2,982	3,326
Hardwoods									
Roundwood supplies	35	22	30	43	59	70	79	84	88
Net annual growth	49	63	81	97	105	102	96	91	87
Inventory	1,184	1,492	1,805	2,183	2,940	3,386	3,686	3,883	4,009
Forest industry									
Softwoods									
Roundwood supplies	484	328	530	893	926	955	983	1,015	1,047
Net annual growth	707	971	889	894	943	992	1,029	1,071	1,104
Inventory	9,921	13,597	13,523	14,557	15,482	16,347	17,078	17,977	18,862
Hardwoods									
Roundwood supplies	157	227	213	184	355	467	556	648	709
Net annual growth	196	278	371	445	498	514	517	521	522
Inventory	5,620	7,636	7,835	9,609	12,574	13,903	14,071	13,484	12,196
Farmer and other private									
Softwoods									
Roundwood supplies	584	748	1,129	1,264	1,495	1,666	1,795	1,885	1,932
Net annual growth	783	1,171	1,656	1,967	2,106	2,118	2,086	2,040	1,982
Inventory	10,800	15,533	23,178	28,112	34,408	38,425	41,253	42,997	43,558
Hardwoods									
Roundwood supplies	937	730	848	713	1,166	1,463	1,724	1,989	2,144
Net annual growth	1,231	1,228	1,580	1,794	1,811	1,753	1,693	1,643	1,587
Inventory	32,343	32,158	33,616	37,704	44,321	46,830	46,689	44,124	39,373
Total South Central									
Softwoods									
Roundwood supplies	1,251	1,197	1,845	2,381	2,630	2,866	3,061	3,218	3,323
Net annual growth	1,751	2,528	2,927	3,171	3,382	3,448	3,448	3,437	3,403
Inventory	24,421	34,615	42,571	49,398	58,280	64,337	68,717	71,778	73,282
Hardwoods									
Roundwood supplies	1,169	1,009	1,123	959	1,606	2,032	2,396	2,764	2,987
Net annual growth	1,531	1,665	2,138	2,460	2,529	2,460	2,375	2,314	2,250
Inventory	40,617	43,631	45,704	52,489	64,057	69,103	69,886	67,178	61,403

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.16—*Sawtimber supplies, net annual growth, and sawtimber inventory in the South Central, by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	631	432	766	1,022	791	973	1,175	1,362	1,502
Net annual growth	937	1,481	1,528	1,185	1,282	1,320	1,318	1,295	1,255
Inventory	12,518	19,928	20,306	24,011	30,278	34,662	37,393	38,127	36,984
Hardwoods									
Sawtimber supplies	159	105	120	106	84	113	141	167	191
Net annual growth	145	252	253	291	421	394	355	334	325
Inventory	3,758	6,001	5,946	7,577	11,623	14,753	17,249	19,186	20,771
Other public									
Softwoods									
Sawtimber supplies	149	119	154	227	231	248	266	282	290
Net annual growth	193	201	284	347	406	451	473	478	469
Inventory	2,430	2,552	4,278	5,759	7,842	9,973	12,272	14,598	16,826
Hardwoods									
Sawtimber supplies	148	81	112	156	224	277	319	351	373
Net annual growth	140	191	243	315	426	437	425	409	392
Inventory	3,377	4,518	5,357	6,745	9,709	11,730	13,267	14,382	15,146
Forest industry									
Softwoods									
Sawtimber supplies	2,204	1,475	2,646	4,657	4,172	4,309	4,434	4,579	4,735
Net annual growth	3,329	4,117	4,123	4,099	4,272	4,466	4,621	4,813	4,984
Inventory	43,982	54,611	57,977	60,477	64,268	68,049	71,090	74,839	78,671
Hardwoods									
Sawtimber supplies	592	801	720	712	1,239	1,678	2,020	2,325	2,446
Net annual growth	524	685	1,030	1,288	1,827	1,919	1,881	1,786	1,632
Inventory	15,245	19,138	22,404	27,495	37,956	43,274	44,260	41,761	35,959
Farmer and other private									
Softwoods									
Sawtimber supplies	1,938	2,807	4,496	5,452	6,118	7,015	7,765	8,334	8,681
Net annual growth	2,643	4,516	6,207	8,040	8,877	9,297	9,414	9,356	9,143
Inventory	34,315	55,878	82,703	102,379	129,077	149,399	165,709	177,278	182,948
Hardwoods									
Sawtimber supplies	3,736	2,832	3,040	2,906	3,750	4,863	5,834	6,753	7,141
Net annual growth	3,430	3,202	4,019	4,935	6,030	6,121	5,942	5,578	5,016
Inventory	90,237	84,040	84,562	96,385	119,279	131,031	133,876	126,853	110,156
Total South Central									
Softwoods									
Sawtimber supplies	4,923	4,834	8,063	11,358	11,313	12,544	13,639	14,557	15,208
Net annual growth	7,102	10,315	12,143	13,672	14,835	15,535	15,826	15,941	15,850
Inventory	93,245	132,969	165,264	192,627	231,466	262,083	286,465	304,842	315,429
Hardwoods									
Sawtimber supplies	4,634	3,818	3,992	3,879	5,297	6,931	8,314	9,595	10,151
Net annual growth	4,239	4,329	5,545	6,830	8,703	8,870	8,603	8,107	7,365
Inventory	112,617	113,697	118,269	138,202	178,567	200,789	208,653	202,182	182,032

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.17—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the Douglas-fir subregion,*[1] *by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock	1,971	1,951	2,420	2,467	2,410	2,195	2,124	2,102	2,052
Net annual growth	975	1,214	1,409	1,545	1,693	1,791	1,878	1,932	1,938
Mortality	700	663	577	484	441	432	432	436	445
Roundwood supplies[2]	2,080	2,059	2,311	2,402	2,261	2,192	2,137	2,093	2,057
Inventory of growing stock[3]	109,904	104,410	99,159	93,685	82,540	78,077	75,059	73,157	72,032
HARDWOODS									
Removals from growing stock	31	57	85	106	175	174	155	141	123
Net annual growth	219	299	383	397	253	182	138	114	98
Mortality	49	62	67	71	124	142	154	163	171
Roundwood supplies[2]	29	50	66	84	101	109	110	107	104
Inventory of growing stock[3]	6,908	9,063	10,981	10,326	12,428	12,886	12,929	12,761	12,561

[1]Western Washington and western Oregon.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volumes that would be harvested given the assumptions of the study.
[3]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Note: Preliminary data from a survey of the forest resources of western Washington, which was completed after the projections in this table were prepared, show that net annual softwood growth and inventories on forest industry lands is likely to be substantially above the volumes included in this table. This, along with reductions in harvest resulting from the slump in demand that began in 1980, suggest that the drop in supplies on these ownerships will not be as large as projected. There is also likely to be an upturn in supplies before the end of the projection period.

Table 4.18—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the Douglas-fir subregion,*[1] *by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber	12,909	12,479	15,084	15,564	13,844	12,127	11,358	10,840	10,243
Net annual growth	5,718	6,458	7,458	8,301	8,659	8,924	9,137	9,214	9,076
Mortality	4,107	3,777	3,097	2,539	2,402	2,269	2,177	2,125	2,099
Sawtimber supplies[2]	13,547	13,249	15,400	16,087	13,398	12,553	11,788	11,121	10,561
Inventory of sawtimber[3]	683,727	629,785	582,565	546,054	461,656	422,774	393,224	371,611	355,995
HARDWOODS									
Removals from sawtimber	122	207	310	360	596	591	531	478	410
Net annual growth	758	1,070	1,330	1,303	818	577	424	323	257
Mortality	159	192	196	191	369	412	435	447	455
Sawtimber supplies[2]	110	175	261	309	360	387	390	375	359
Inventory of sawtimber[3]	23,318	31,037	37,873	33,502	39,739	40,821	40,456	39,297	37,898

[1]Western Washington and western Oregon.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volumes that would be harvested given the assumptions of the study.
[3]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Note: Preliminary data from a survey of the forest resources of western Washington, which was completed after the projections in this table were prepared, show that net annual softwood growth and inventories on forest industry lands is likely to be substantially above the volumes included in this table. This, along with reductions in harvest resulting from the slump in demand that began in 1980, suggest that the drop in supplies on these ownerships will not be as large as projected. There is also likely to be an upturn in supplies before the end of the projection period.

Table 4.19—*Roundwood supplies, net annual growth, and growing stock inventory in the Douglas-fir subregion,*[1] *by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	361	586	489	511	631	676	682	678	667
Net annual growth	180	197	240	227	381	485	566	617	617
Inventory	47,584	47,704	45,478	44,088	36,544	34,111	32,356	31,319	30,617
Hardwoods									
Roundwood supplies	([2])	1	4	1	1	1	1	1	1
Net annual growth	13	14	14	14	1	−1	−1	−1	−1
Inventory	804	972	1,053	999	965	949	923	895	867
Other public									
Softwoods									
Roundwood supplies	158	290	343	428	395	400	425	449	476
Net annual growth	193	316	356	371	431	469	501	527	548
Inventory	20,085	19,787	19,610	19,161	19,971	20,378	21,102	21,913	22,825
Hardwoods									
Roundwood supplies	5	3	9	12	15	15	16	16	16
Net annual growth	33	57	91	92	38	21	15	13	12
Inventory	1,080	1,526	2,030	2,263	2,779	2,807	2,759	2,691	2,631
Forest industry									
Softwoods[3]									
Roundwood supplies	1,244	976	1,234	1,268	1,019	901	820	761	714
Net annual growth	337	393	455	606	602	606	607	599	590
Inventory	32,725	27,399	23,767	21,978	16,823	14,544	12,866	11,493	10,418
Hardwoods									
Roundwood supplies	18	22	37	34	48	52	52	49	45
Net annual growth	75	98	124	145	104	79	62	51	43
Inventory	1,889	2,663	3,264	3,336	4,335	4,683	4,812	4,791	4,737
Farmer and other private									
Softwoods									
Roundwood supplies	317	207	245	195	216	215	210	205	200
Net annual growth	265	308	358	340	277	231	204	189	182
Inventory	9,510	9,520	10,304	8,458	9,202	9,043	8,736	8,431	8,171
Hardwoods									
Roundwood supplies	6	24	16	37	38	41	41	41	41
Net annual growth	98	130	154	146	110	82	63	51	45
Inventory	3,135	3,902	4,634	3,728	4,349	4,447	4,436	4,384	4,326
Total Douglas-fir subregion									
Softwoods									
Roundwood supplies	2,080	2,059	2,311	2,402	2,261	2,192	2,137	2,093	2,057
Net annual growth	975	1,214	1,409	1,545	1,693	1,791	1,878	1,932	1,938
Inventory	109,904	104,410	99,159	93,685	82,540	78,077	75,059	73,157	72,032
Hardwoods									
Roundwood supplies	29	50	66	84	101	109	110	107	104
Net annual growth	219	299	383	397	253	182	138	114	98
Inventory	6,908	9,063	10,981	10,326	12,428	12,886	12,929	12,761	12,561

[1]Western Washington and western Oregon.

[2]Less than 0.5 million cubic feet.

[3]Preliminary data from a survey of the forest resources of western Washington, which was completed after the projections in this table were prepared, show that net annual softwood growth and inventories on forest industry lands is likely to be substantially above the volumes included in this table. This, along with reductions in harvest resulting from the slump in demand that began in 1980, suggest that the drop in supplies on these ownerships will not be as large as projected. There is also likely to be an upturn in supplies before the end of the projection period.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.20—*Sawtimber supplies, net annual growth, and sawtimber inventory in the Douglas-fir subregion,*[1] *by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	2,371	3,861	3,415	3,423	4,012	4,225	4,168	4,038	3,882
Net annual growth	1,065	1,126	1,467	1,320	2,146	2,641	3,009	3,230	3,213
Inventory	293,206	290,310	273,609	270,762	220,983	202,437	187,470	176,762	168,545
Hardwoods									
Sawtimber supplies	1	4	19	3	5	5	7	5	3
Net annual growth	68	89	62	62	1	−12	−17	−20	−21
Inventory	4,036	5,040	5,538	5,282	5,066	4,878	4,617	4,340	4,052
Other public									
Softwoods									
Sawtimber supplies	1,087	1,950	2,444	3,102	2,507	2,479	2,561	2,632	2,711
Net annual growth	1,522	1,738	1,910	1,961	2,280	2,451	2,602	2,718	2,814
Inventory	123,953	118,470	113,743	108,422	108,425	106,973	107,387	108,546	110,507
Hardwoods									
Sawtimber supplies	22	8	36	47	57	60	61	62	64
Net annual growth	126	193	285	277	126	75	53	41	33
Inventory	3,110	4,543	6,122	6,921	8,424	8,474	8,273	7,974	7,658
Forest industry									
Softwoods[2]									
Sawtimber supplies	8,257	6,317	8,123	8,409	5,713	4,704	3,958	3,393	2,948
Net annual growth	1,840	2,043	2,287	3,277	2,862	2,693	2,530	2,351	2,182
Inventory	214,232	171,505	142,844	124,702	87,409	70,008	57,140	47,141	39,623
Hardwoods									
Sawtimber supplies	71	80	142	120	162	178	176	163	146
Net annual growth	210	311	407	482	333	241	173	124	89
Inventory	6,382	8,766	10,718	9,620	12,724	13,667	13,791	13,349	12,727
Farmer and other private									
Softwoods									
Sawtimber supplies	1,832	1,121	1,418	1,153	1,166	1,145	1,102	1,058	1,021
Net annual growth	1,291	1,551	1,794	1,743	1,372	1,139	997	914	867
Inventory	52,336	49,500	52,369	42,168	44,839	43,356	41,227	39,161	37,320
Hardwoods									
Sawtimber supplies	17	83	64	139	136	144	146	146	146
Net annual growth	354	477	576	482	358	273	215	179	157
Inventory	9,790	12,688	15,495	11,679	13,525	13,803	13,775	13,633	13,461
Total Douglas-fir subregion									
Softwoods									
Sawtimber supplies	13,547	13,249	15,400	16,087	13,398	12,553	11,788	11,121	10,561
Net annual growth	5,718	6,458	7,458	8,301	8,659	8,924	9,137	9,214	9,076
Inventory	683,727	629,785	582,565	546,054	461,656	422,774	393,224	371,611	355,995
Hardwoods									
Sawtimber supplies	110	175	261	309	360	387	390	375	359
Net annual growth	758	1,070	1,330	1,303	818	577	424	323	257
Inventory	23,318	31,037	37,873	33,502	39,739	40,821	40,456	39,297	37,898

[1]Western Washington and western Oregon.

[2]Preliminary data from a survey of the forest resources of western Washington, which was completed after the projections in this table were prepared, show that net annual softwood growth and inventories on forest industry lands is likely to be substantially above the volumes included in this table. This, along with reductions in harvest resulting from the slump in demand that began in 1980, suggest that the drop in supplies on these ownerships will not be as large as projected. There is also likely to be an upturn in supplies before the end of the projection period.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.21—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the Ponderosa Pine subregion,*[1] *by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock	379	483	586	635	810	630	660	697	725
Net annual growth	498	605	653	614	660	709	756	796	833
Mortality	252	243	248	215	231	236	245	255	267
Roundwood supplies[2]	348	454	548	593	543	587	634	679	723
Inventory of growing stock[3]	39,670	40,584	41,157	38,850	36,241	36,963	37,860	38,820	39,889
HARDWOODS									
Removals from growing stock	1	1	2	([4])	([4])	([4])	([4])	([4])	([4])
Net annual growth	3	3	3	4	3	3	3	3	3
Mortality	1	2	1	1	([4])	([4])	([4])	([4])	([4])
Roundwood supplies[2]	([4])	([4])	([4])	([4])	([4])	([4])	([4])	([4])	([4])
Inventory of growing stock[3]	168	184	198	196	262	296	310	334	351

[1]Eastern Washington and eastern Oregon.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volumes that would be harvested given the assumptions of the study.
[3]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.
[4]Less than 0.5 million cubic feet.

Table 4.22—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the Ponderosa Pine subregion,*[1] *by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber	2,332	2,937	3,491	3,549	4,479	3,249	3,296	3,367	3,389
Net annual growth	1,996	2,579	2,808	2,568	2,954	3,083	3,187	3,267	3,331
Mortality	1,208	1,048	1,055	931	1,011	983	964	953	949
Sawtimber supplies[2]	2,300	2,879	3,350	3,354	3,046	3,168	3,297	3,400	3,475
Inventory of sawtimber[3]	207,960	200,527	195,453	181,432	165,047	161,900	159,499	157,362	155,792
HARDWOODS									
Removals from sawtimber	2	3	6	([4])	([4])	([4])	([4])	([4])	([4])
Net annual growth	9	10	10	10	12	12	12	12	15
Mortality	3	1	1	1	([4])	([4])	([4])	([4])	([4])
Sawtimber supplies[2]	2	2	4	([4])	([4])	([4])	([4])	([4])	([4])
Inventory of sawtimber[3]	424	437	494	480	646	700	757	791	827

[1]Eastern Washington and eastern Oregon.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volumes that would be harvested given the assumptions of the study.
[3]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.
[4]Less than 0.5 million board feet.

Table 4.23—*Roundwood supplies, net annual growth, and growing stock inventory in the Ponderosa Pine subregion,*[1] *by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	100	232	286	292	216	259	298	332	360
Net annual growth	261	310	329	312	326	354	380	403	423
Inventory	23,408	25,757	25,911	23,649	21,440	22,167	22,819	23,367	23,898
Hardwoods									
Roundwood supplies	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	1	1	1	1	(2)	(2)	(2)	(2)	(2)
Inventory	40	44	44	39	44	52	51	51	50
Other public									
Softwoods									
Roundwood supplies	48	61	97	89	131	132	135	138	141
Net annual growth	66	88	91	96	105	111	117	122	128
Inventory	7,792	6,536	6,483	6,748	6,422	6,134	5,914	5,746	5,638
Hardwoods									
Roundwood supplies	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	1	1	1	1	(2)	(2)	(2)	(2)	(2)
Inventory	55	58	59	59	72	77	80	82	85
Forest industry									
Softwoods									
Roundwood supplies	100	94	117	151	126	115	110	109	109
Net annual growth	62	71	84	85	90	92	95	97	100
Inventory	3,975	3,972	4,038	3,849	3,048	2,698	2,494	2,370	2,297
Hardwoods									
Roundwood supplies	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	(2)	(2)	(2)	1	(2)	(2)	(2)	(2)	(2)
Inventory	11	12	18	19	28	33	33	39	44
Farmer and other private									
Softwoods									
Roundwood supplies	100	67	48	60	70	80	90	101	112
Net annual growth	109	136	148	121	139	152	163	174	182
Inventory	4,495	4,319	4,725	4,604	5,330	5,965	6,633	7,337	8,056
Hardwoods									
Roundwood supplies	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	1	1	1	2	3	3	3	3	3
Inventory	62	70	77	79	119	134	147	162	172
Total Ponderosa Pine subregion									
Softwoods									
Roundwood supplies	348	454	548	593	543	587	634	679	723
Net annual growth	498	605	653	614	660	709	756	796	833
Inventory	39,670	40,584	41,157	38,850	36,241	36,963	37,860	38,820	39,889
Hardwoods									
Roundwood supplies	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	3	3	3	4	3	3	3	3	3
Inventory	168	184	198	196	262	296	310	334	351

[1]Eastern Washington and eastern Oregon.
[2]Less than 0.5 million cubic feet.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.24—*Sawtimber supplies, net annual growth, and sawtimber inventory in the Ponderosa Pine subregion,*[1] *by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	713	1,532	1,801	1,652	1,315	1,529	1,706	1,836	1,921
Net annual growth	1,080	1,284	1,400	1,228	1,528	1,625	1,706	1,766	1,813
Inventory	126,938	133,691	129,284	115,861	106,274	106,309	105,699	104,434	103,029
Hardwoods									
Sawtimber supplies	1	1	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	3	3	3	3	(2)	(2)	(2)	(2)	(2)
Inventory	105	111	107	95	123	121	128	127	126
Other public									
Softwoods									
Sawtimber supplies	310	379	583	505	730	709	693	674	659
Net annual growth	263	409	446	470	500	506	507	507	508
Inventory	38,975	31,642	30,589	31,900	28,917	26,468	24,407	22,655	21,231
Hardwoods									
Sawtimber supplies	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	3	4	4	5	9	9	9	9	11
Inventory	184	190	218	213	303	331	352	365	376
Forest industry									
Softwoods									
Sawtimber supplies	645	572	697	854	629	516	439	384	340
Net annual growth	234	318	360	356	342	315	291	267	245
Inventory	22,033	18,618	17,764	16,302	10,458	7,820	6,051	4,765	3,799
Hardwoods									
Sawtimber supplies	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	1	1	1	1	(2)	(2)	(2)	(2)	(2)
Inventory	30	27	44	42	61	70	77	81	88
Farmer and other private									
Softwoods									
Sawtimber supplies	632	396	269	342	372	414	459	506	555
Net annual growth	419	568	602	514	584	636	683	727	766
Inventory	20,014	16,576	17,816	17,369	19,399	21,303	23,342	25,508	27,732
Hardwoods									
Sawtimber supplies	1	1	4	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	2	2	2	2	3	3	3	3	3
Inventory	105	109	125	130	159	178	200	219	238
Total Ponderosa Pine subregion									
Softwoods									
Sawtimber supplies	2,300	2,879	3,350	3,354	3,046	3,168	3,297	3,400	3,475
Net annual growth	1,996	2,579	2,808	2,568	2,954	3,083	3,187	3,267	3,331
Inventory	207,960	200,527	195,453	181,432	165,047	161,900	159,499	157,362	155,792
Hardwoods									
Sawtimber supplies	2	2	4	(2)	(2)	(2)	(2)	(2)	(2)
Net annual growth	9	10	10	10	12	12	12	12	15
Inventory	424	437	494	480	646	700	757	791	827

[1]Eastern Washington and eastern Oregon.
[2]Less than 0.5 million board feet.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.25—*Timber removals, net annual growth, mortality, supplies of roundwood products, and inventory of growing stock in the Pacific Southwest,[1] by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from growing stock	1,120	1,001	901	818	1,099	912	795	829	848
Net annual growth	444	500	698	713	775	840	906	956	991
Mortality	367	346	169	138	130	132	140	149	158
Roundwood supplies[2]	953	847	829	765	765	767	796	836	882
Inventory of growing stock[3]	58,006	53,365	47,696	45,975	41,395	40,538	41,396	42,636	44,121
HARDWOODS									
Removals from growing stock	13	20	26	15	49	44	34	34	33
Net annual growth	75	80	92	79	48	39	33	30	28
Mortality	10	10	8	7	18	23	27	29	30
Roundwood supplies[2]	6	11	16	13	24	25	28	29	29
Inventory of growing stock[3]	2,828	2,975	3,797	3,693	3,913	3,951	3,978	3,958	3,921

[1]Excludes Hawaii.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volumes that would be harvested given the assumptions of the study.
[3]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.26—*Sawtimber removals, net annual growth, mortality, supplies of sawtimber products, and inventory of sawtimber in the Pacific Southwest,[1] by softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
SOFTWOODS									
Removals from sawtimber	6,941	6,046	5,581	5,072	6,619	5,267	4,366	4,366	4,282
Net annual growth	2,038	2,184	3,938	3,886	3,402	3,571	3,819	4,037	4,209
Mortality	1,936	1,728	915	777	625	578	562	555	557
Sawtimber supplies[2]	6,475	5,638	5,408	5,023	4,690	4,544	4,523	4,536	4,599
Inventory of sawtimber[3]	337,797	299,247	267,081	255,594	214,475	196,652	188,208	182,952	180,417
HARDWOODS									
Removals from sawtimber	24	36	56	31	128	110	81	84	79
Net annual growth	156	161	168	138	106	84	72	64	58
Mortality	22	23	29	25	37	46	51	54	55
Sawtimber supplies[2]	14	22	52	52	61	64	72	76	76
Inventory of sawtimber[3]	5,575	5,725	7,286	8,075	8,377	8,330	8,263	8,072	7,843

[1]Excludes Hawaii.
[2]Data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volumes that would be harvested given the assumptions of the study.
[3]Data for 1952 and 1962 are as of December 31. Data for 1970 and the projection years are as of January 1. Data shown under 1976 are as of January 1, 1977.

Table 4.27—*Roundwood supplies, net annual growth, and growing stock inventory in the Pacific Southwest,*[1] *by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million cubic feet)

Item	1952	1962	1970	1976	Projections 1990	2000	2010	2020	2030
National Forest									
Softwoods									
Roundwood supplies	89	216	346	286	336	341	344	350	361
Net annual growth	162	186	338	364	359	373	394	411	423
Inventory	29,590	29,391	28,694	28,073	24,871	24,149	24,517	25,061	25,805
Hardwoods									
Roundwood supplies	2	3	5	1	2	4	7	9	10
Net annual growth	29	30	20	16	12	10	9	8	8
Inventory	1,276	1,286	1,255	1,133	1,132	1,158	1,183	1,177	1,156
Other public									
Softwoods									
Roundwood supplies	3	16	26	22	16	16	17	18	18
Net annual growth	14	14	14	14	15	17	18	20	22
Inventory	1,892	1,435	1,150	1,108	1,083	1,084	1,074	1,096	1,138
Hardwoods									
Roundwood supplies	(2)	1	1	2	5	5	4	4	4
Net annual growth	6	5	8	8	6	5	5	4	4
Inventory	218	190	263	283	269	266	260	259	258
Forest industry									
Softwoods									
Roundwood supplies	393	385	294	321	261	243	243	249	255
Net annual growth	90	108	135	139	168	198	214	221	223
Inventory	11,268	9,639	8,244	7,457	5,766	5,392	5,127	4,957	4,785
Hardwoods									
Roundwood supplies	2	3	3	3	3	3	3	3	3
Net annual growth	11	15	24	19	4	3	3	3	3
Inventory	336	449	717	679	777	815	811	802	794
Farmer and other private									
Softwoods									
Roundwood supplies	468	230	163	136	152	166	192	219	249
Net annual growth	178	192	211	197	233	253	280	304	323
Inventory	15,256	12,900	9,608	9,337	9,675	9,913	10,678	11,521	12,393
Hardwoods									
Roundwood supplies	2	4	7	7	13	12	13	12	12
Net annual growth	29	30	40	36	26	20	17	14	12
Inventory	998	1,050	1,562	1,598	1,736	1,711	1,724	1,720	1,714
Total Pacific Southwest									
Softwoods									
Roundwood supplies	953	847	829	765	765	767	796	836	882
Net annual growth	444	500	698	713	775	840	906	956	991
Inventory	58,006	53,365	47,696	45,975	41,395	40,538	41,396	42,636	44,121
Hardwoods									
Roundwood supplies	6	11	16	13	24	25	28	29	29
Net annual growth	75	80	92	79	48	39	33	30	28
Inventory	2,828	2,975	3,797	3,693	3,913	3,951	3,978	3,958	3,921

[1]Excludes Hawaii.
[2]Less than 0.5 million cubic feet.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Table 4.28—*Sawtimber supplies, net annual growth, and sawtimber inventory in the Pacific Southwest,[1] by ownership and softwoods and hardwoods, 1952, 1962, 1970, and 1976, with base level projections to 2030*

(Million board feet, International ¼-inch log rule)

Item	1952	1962	1970	1976	Projections				
					1990	2000	2010	2020	2030
National Forest									
Softwoods									
Sawtimber supplies	681	1,502	2,439	2,046	2,189	2,194	2,178	2,168	2,175
Net annual growth	735	829	1,770	1,896	1,531	1,562	1,649	1,727	1,796
Inventory	176,982	171,879	163,227	157,958	130,989	119,560	113,777	109,171	105,942
Hardwoods									
Sawtimber supplies	8	8	19	5	7	15	24	29	34
Net annual growth	50	49	33	25	30	25	24	23	23
Inventory	2,274	2,237	2,120	2,955	2,913	2,940	2,948	2,868	2,754
Other public									
Softwoods									
Sawtimber supplies	26	108	172	149	99	101	106	105	105
Net annual growth	59	57	94	89	84	88	91	98	107
Inventory	10,952	7,955	6,464	6,356	6,065	5,946	5,737	5,678	5,704
Hardwoods									
Sawtimber supplies	1	2	4	11	14	12	10	9	7
Net annual growth	12	10	13	14	9	8	7	6	5
Inventory	474	403	525	572	452	390	336	300	271
Forest industry									
Softwoods									
Sawtimber supplies	2,540	2,473	1,777	1,965	1,494	1,282	1,154	1,057	990
Net annual growth	423	493	828	791	691	749	782	797	788
Inventory	63,406	51,532	44,920	40,883	27,860	22,602	18,549	15,872	14,082
Hardwoods									
Sawtimber supplies	2	4	11	6	7	7	8	7	7
Net annual growth	24	30	40	24	8	7	7	7	6
Inventory	714	896	1,355	1,206	1,366	1,427	1,413	1,395	1,375
Farmer and other private									
Softwoods									
Sawtimber supplies	3,228	1,555	1,020	863	908	968	1,085	1,206	1,329
Net annual growth	821	803	1,246	1,110	1,097	1,172	1,296	1,415	1,518
Inventory	86,457	67,881	52,470	50,397	49,561	48,545	50,146	52,231	54,688
Hardwoods									
Sawtimber supplies	3	8	18	30	32	30	31	30	28
Net annual growth	70	72	82	74	59	44	35	28	23
Inventory	2,113	2,189	3,286	3,342	3,646	3,573	3,565	3,510	3,442
Total Pacific Southwest									
Softwoods									
Sawtimber supplies	6,475	5,638	5,408	5,023	4,690	4,544	4,523	4,536	4,599
Net annual growth	2,038	2,184	3,938	3,886	3,402	3,571	3,819	4,037	4,209
Inventory	337,797	299,247	267,081	255,594	214,475	196,652	188,208	182,952	180,417
Hardwoods									
Sawtimber supplies	14	22	52	52	61	64	72	76	76
Net annual growth	156	161	168	138	106	84	72	64	58
Inventory	5,575	5,725	7,286	8,075	8,377	8,330	8,263	8,072	7,843

[1]Excludes Hawaii.

Note: Supply data for 1952, 1962, 1970, and 1976 are estimates of the trend level of harvests and differ somewhat from the estimates of actual consumption shown in some tables in other chapters. For the projection years, the data show the volume that would be harvested given the assumptions of the study. Inventory data for 1952 and 1962 are as of December 31. Inventory data for 1970 and the projection years are as of January 1. Inventory data shown under 1976 are as of January 1, 1977.

Appendix 5
Converting Factors

This appendix presents converting factors for the timber resource (standing timber), roundwood products (sawlogs, veneer logs, etc.), and processed wood products (lumber, plywood, etc.).

Units of measure used in forestry and the timber products industry are many and varied. Even for a given unit of measure, the volume of solid wood per unit varies with species, form, size, and quality of pieces being measured. Converting factors vary accordingly. A detailed listing and discussion of all possible converting factors is beyond the scope of this appendix. Resource and roundwood factors presented here are averages based on data collected as a part of the periodic surveys of forest resources of each State, carried on by the Forest Service and cooperating public and private organizations, and they reflect the mix of species, sizes, and quality in the inventory and the roundwood product output in 1976, as shown in Appendix 3.

Converting factors are shown in both standard United States and metric units where appropriate.

Forest Resource Factors

Timber inventory in this report is given in two units of measure. Growing stock volume is measured in cubic feet to show the total volume in the central stem of standing trees 5 inches in diameter and larger at breast height. Sawtimber (the portion of growing stock in trees 9 inches in diameter and larger for softwoods and 11 inches and larger for hardwoods) is measured in board feet, International ¼-inch log rule.

Proportions of total tree inventory in growing stock, sawtimber, and poletimber-size trees, and nongrowing stock trees, are given in table 5.1. Variation in the ratios of inventory in growing stock and nongrowing stock trees between sections is attributable to differences in the amounts of defective or unmerchantable material in the stands. Variation in the proportions in sawtimber and poletimber trees reflects differences in the sizes of the trees in the inventories.

Table 5.2 shows the relationship between growing stock and sawtimber for different sections and for the two major species groups. These ratios are indicative of tree size and quality. Cubic feet of growing stock per board foot of sawtimber decreases, and board feet of sawtimber per cubic foot of growing stock increases, as the proportion of growing stock in sawtimber-size trees increases. This proportion is smaller for hardwoods than for softwoods both because of tree size and because the lower limit for hardwood sawtimber is 11 inches in diameter at breast height compared to 9 inches for softwoods.

Roundwood Factors

In the periodic surveys of the forest resources of each State, information is collected on the output of roundwood timber products. Table 5.3 shows the source of roundwood timber products produced in 1976, i.e., the proportion of softwood and hardwood roundwood products that was obtained from growing stock and from rough, rotten, or dead trees, and other nongrowing stock sources. For the United States as a whole, 93 percent of softwood and 86 percent of hardwood product output came from growing stock. Fuelwood and pulpwood accounted for the bulk of output from nongrowing stock sources.

As shown in Table 5.4, roundwood products account for 88 percent of the removals from softwood growing stock and 93 percent of removals from softwood sawtimber. Logging residues amount to 8 percent of removals from growing stock and 4.5 percent of output from sawtimber. For hardwoods, the yield of products is lower and the percentage of logging residues is higher. Other removals—the timber removed from inventories by land clearing, cultural operations, and changes in land use—account for the remainder.

Because of volume losses in the form of logging residues and other removals, the volume of timber taken from growing stock inventories considerably exceeds products output. This is shown in table 5.5. For all softwood products in the United States, an average of 1.056 units of growing stock is removed for each unit of roundwood product output. For all hardwoods, the ratio is 1.268 units of growing stock per unit of product. The low factors shown for fuelwood reflect the high percentage of this product that is obtained from nongrowing stock sources.

In addition to cubic feet of roundwood, the forest survey statistics show the output of the various timber products produced in the United States in standard units of measure, i.e., sawlogs, veneer logs and bolts, and cooperage logs and bolts in board feet, International ¼-inch log rule; pulpwood and fuelwood in standard rough cords of 128 cubic feet; poles and posts in numbers of pieces; piling in linear feet; and mine timbers and other miscellaneous industrial timber products in cubic feet. Tables 5.6 and 5.7 show cubic feet and cubic meters, respectively, per standard unit of roundwood product output. The factors are weighted averages for each section, and the United States, based on the species mix and volumes of output in each State and timber supply region in 1976.

Other units of measure, such as board feet, lumber tally or board feet, local log scale, are in common use in the primary timber processing industries. Local log scale varies according to the log rule (Doyle, Scribner, etc.) that is used which, in turn, varies with species, product, and locality. Table 5.8 shows cubic feet of solid wood per unit measure of sawlog input and lumber output, and board feet of lumber yield per unit of log input for commonly used units of sawlog measure. For example, on the average for United States softwoods, 156 cubic feet of logs is required to produce 1,000 board feet of lumber; 1,000 board feet of logs (International ¼-inch log rule) contains 160 cubic feet of solid wood and will produce 1,026 board feet of lumber; 1,000 board feet of logs (local log rule) contains 185 cubic feet of solid wood and will produce 1,186 board feet of lumber.

Table 5.9 shows cubic feet of solid wood per unit measure of veneer log input and veneer output, and square feet of veneer yield per unit of log input for commonly used units of veneer log measure. The sawlog and veneer log factors are averages based on the mix of species and processing methods used, and volumes of output in 1976.

The factors in table 5.8 result in an average lumber recovery factor (LRF—board feet of lumber per cubic foot of roundwood input) of 6.4 for softwoods and 6.1 for hardwoods. The factor in table 5.9 result in an average veneer recovery factor (VRF—square feet of veneer, ⅜-inch thickness, per cubic foot of roundwood input) of 16.8 for softwoods and 18.1 for hardwoods.

Table 5.10 shows the solid wood

content in metric units for the commonly used measures of saw log and veneer log volume.

Wood Product Factors

Conversion factors for standard units of processed wood products (1,000 board feet of lumber; 1,000 square feet, ⅜-inch thickness, of veneer or plywood; 1,000 square feet, ¾-inch thickness, of particleboard; etc.) are given in table 5.11. The table shows the cubic volume of a unit of product, the cubic volume of raw material (roundwood equivalent) required to produce a unit of product, and a ratio of raw material volume to volume of finished product. For example, on the average, 1,000 board feet of softwood lumber contains 60 cubic feet (1.7 cubic meters) of solid wood and requires 156 cubic feet (4.417 cubic meters) of sawlogs to produce. Thus, 2.6 cubic feet (cubic meters) of raw material yields 1 cubic foot (cubic meter) of softwood lumber.

The difference between the cubic volumes of 1,000 board feet of softwood and hardwood lumber is due to differences in the characteristics and dimensions of the products as they are commonly sold by the producing mills. Based on nominal dimensions, 1,000 board feet of lumber of any species would contain 83.33 cubic feet (2.36 cubic meters). But the actual volume of wood per 1,000 board feet is affected by many factors including:

- —The sawing accuracy (quality control) of the sawmill.
- —Target dimensions (width and thickness) which are different for softwoods and hardwoods.
- —The condition of the lumber when measured (rough-green, rough-dry, surfaced-dry).

Volumetric shrinkage is less for softwoods than for hardwoods, and softwoods are more often sawn on band sawmills to closer tolerances than hardwoods. It is common practice to saw softwood lumber to less than nominal dimensions. Target thicknesses vary from mill to mill, and from region to region. The average volume of wood per 1,000 board feet of rough, green softwood lumber is estimated to be about 80 cubic feet (2.27 cubic meters). The same lumber, when dried and surfaced to standard softwood dressed, dry dimensions will contain 57 cubic feet (1.61 cubic meters) of solid wood. The difference (23 cubic feet) is in shrinkage and the wood removed as the lumber is surfaced (planed).

Hardwoods are commonly sawn oversize to allow for greater shrinkage and sawing variation. The average volume of wood per 1,000 board feet of rough, green hardwood lumber is estimated to be about 95 cubic feet (2.69 cubic meters). This lumber, when dried and surfaced to standard thickness for hardwoods, would contain about 67 cubic feet (1.9 cubic meters).

Softwood lumber is most commonly sold by producing mills as surfaced, dry, while hardwood lumber is commonly sold rough, dry; thus, the difference in the volumes per 1,000 board feet shown in table 5.11. These are estimated averages for all softwood and hardwood lumber.

The differences in the factors shown in table 5.11 for veneer and plywood reflect the layup and trim losses of dry, untrimmed veneer during the production of plywood. The factor of 62.7 cubic feet (1.776 cubic meters) of roundwood per 1,000 square feet, ⅜-inch thickness, of hardwood plywood assumes that the product is composed entirely of hardwood materials. Bureau of Census data indicate that about 40 percent of the logs, bolts, flitches, and purchased veneer consumed in the manufacture of hardwood plywood is softwood material used for backs and inner plies. At a mix of 60 percent hardwood and 40 percent softwood, 65.6 cubic feet (1.858 cubic meters) of raw material would be required per 1,000 square feet, ⅜-inch thickness, of plywood—37.6 cubic feet of hardwood and 28.0 cubic feet of softwood.

The low product yields indicated by the ratios of raw material volume to product volume for lumber, veneer, and plywood in table 5.11 are not a measure of wood utilization. Nearly all of the byproducts of lumber, veneer, and plywood production (i.e. slabs, edgings, sawdust, veneer cores, and clippings) are used for pulpwood, particleboard, or fuel. For example, in 1978, an estimated 4.9 billion cubic feet (138.9 million cubic meters) of softwood sawlogs was processed by U.S. sawmills. Output from this roundwood included 1.8 billion cubic feet (51.5 million cubic meters) of softwood lumber, 1.9 billion cubic feet (53.5 million cubic meters) of pulpwood, 0.3 billion cubic feet (8.6 million cubic meters) of particleboard furnish, and 0.4 billion cubic feet (10.2 million cubic meters) of fuelwood. Total output of products was approximately 4.5 billion cubic feet (128.8 million cubic meters). In terms of solid volume of lumber only, recovery from the roundwood input was 37 percent. Based on total output of all products, recovery was 92.7 percent.

Factors in table 5.11 for particleboard, hardboard, and insulating board indicate a loss of raw material in production of particleboard and hardboard, and a gain in production of insulating board. This is due to the relative densities of the raw materials and the finished products. In particleboard and hardboard production, raw materials are compressed so as to increase the density and reduce the volume of the product relative to its raw material. Insulating board is a low-density product which contains considerable air space. Thus, 0.46 cubic feet (cubic meters) of raw material is expanded to 1 cubic foot (cubic meter) of final product.

Woodpulp conversion factors, by pulping process and for all processes, are given in table 5.12, which shows pulpwood consumption per ton of pulp produced in standard U.S. and metric units.

Weights of timber products are shown in table 5.13. These weight factors were used to determine tonnages of products discussed in Chapter 10, page 264, and listed in Appendix 1, table 1.25.

Weights of roundwood products are based on an estimated average of 35 pounds per cubic foot of solid wood for softwoods and 40 pounds per cubic foot for hardwoods, at 15 percent moisture content.

Weights of lumber are weighted averages for the species and volumes of production reported by Bureau of the Census for 1978. Average weights per 1,000 board feet, at 15 percent moisture content,[1] were used to convert volumes by species, to tons. Weight of dressed lumber was used for softwoods because the product is ordinarily sold surfaced. Weight of rough lumber was used for hardwoods because the product is ordinarily sold rough.

Plywood weights are averages for the species and volumes of production reported by the Bureau of the Census for 1978. Average weights per cubic foot (15 percent moisture content) were used to convert volume, by species, to tons at 31.25 cubic feet per 1,000 square feet, ⅜-inch thickness.

The weight of hardwood plywood has been adjusted for a raw material mix of 60 percent hardwood and 40 percent softwood.

[1] U.S. Department of Agriculture, Forest Service, Forest Prod. Lab. Wood Handbook. Agric. Handb. 72. Govt. Print. Off., Washington, D.C. 528 p. 1955.

Particleboard weight is based on a bone dry weight of 46 pounds per cubic foot of product, and is adjusted to air dry moisture content, and to delete the weight of resin and wax (8.5 percent of bone dry weight).

Hardboard and insulating board weights are those reported by the Bureau of the Census, with weight of additives deleted. Census data show an average of 0.73 tons of woodpulp consumed per ton of board produced.

Table 5.1—*Timber inventory in growing stock and nongrowing stock trees in the United States, by softwoods and hardwoods and section, 1977*

(Percent)

Softwoods

Section	Total	Growing stock trees			Nongrowing stock trees[1]
		Total	Sawtimber	Poletimber	
North	100.0	91.7	47.8	44.0	8.3
South	100.0	97.7	69.6	28.0	2.3
Rocky Mountain	100.0	90.0	69.6	20.4	10.0
Pacific Coast	100.0	94.8	87.4	7.4	5.2
United States	100.0	94.0	75.9	18.1	6.0
Hardwoods					
North	100.0	85.8	42.1	43.7	14.2
South	100.0	79.8	47.1	32.7	20.2
Rocky Mountain	100.0	70.4	27.4	43.0	29.6
Pacific Coast	100.0	85.9	51.8	34.1	14.1
United States	100.0	82.9	44.5	38.4	17.1

[1]Rough, rotten, and salvable dead trees.

Note: Data may not add to totals because of rounding.

Source: Appendix 3, table 8.

Table 5.2—*Growing stock—sawtimber inventory ratios in the United States, by softwoods and hardwoods and section, 1977*

Softwoods

Section	Cubic feet growing stock per board foot sawtimber[1]	Board feet sawtimber[1] per cubic foot growing stock	Percent of growing stock in sawtimber-size trees[2]	Cubic feet per 1000 board feet—sawtimber-size trees[1 2]
North	0.4619	2.165	52.1	240.5
South	.2848	3.511	71.3	203.1
Rocky Mountain	.2496	4.006	77.3	193.0
Pacific Coast	.1877	5.328	92.2	173.0
United States	.2296	4.355	80.7	185.3
Hardwoods				
North	.4898	2.042	49.0	240.2
South	.3832	2.610	59.0	226.1
Rocky Mountain	.4984	2.006	38.9	193.9
Pacific Coast	.3548	2.818	60.3	213.9
United States	.4299	2.326	53.7	230.8

[1]International ¼-inch log rule.
[2]Softwood trees 9 inches d.b.h. and larger, hardwood trees 11 inches d.b.h. and larger.

Source: Appendix 3, tables 19, 20, 21, and 22.

Table 5.3—*Source of roundwood timber products in the United States, by softwoods and hardwoods, product, and section, 1976*

(Percent)

Section and product	Softwood products: All sources	Softwood products: Growing stock	Softwood products: Rough and rotten trees	Softwood products: Dead trees	Softwood products: Other sources[1]	Hardwood products: All sources	Hardwood products: Growing stock	Hardwood products: Rough and rotten trees	Hardwood products: Dead trees	Hardwood products: Other sources[1]
North										
Saw logs	100.0	92.0	0.5	0.6	6.9	100.0	92.2	4.9	0.6	2.3
Veneer logs	100.0	93.4	.2	....	6.5	100.0	92.5	5.0	....	2.5
Pulpwood	100.0	84.8	1.4	1.1	12.7	100.0	87.4	5.4	1.5	5.7
Miscellaneous industrial	100.0	82.6	1.6	8.5	7.3	100.0	82.5	11.1	.9	5.5
Fuelwood	100.0	37.8	18.7	10.3	33.2	100.0	46.0	10.2	9.2	34.6
All products	100.0	87.5	1.1	1.2	10.1	100.0	83.5	6.2	2.1	8.2
South										
Saw logs	100.0	98.2	.4	....	1.3	100.0	95.8	3.2	.5	.5
Veneer logs	100.0	98.1	.5	....	1.4	100.0	96.8	2.5	....	.7
Pulpwood	100.0	92.6	1.5	.2	5.6	100.0	86.5	7.2	.2	6.1
Miscellaneous industrial	100.0	95.0	.8	.6	3.6	100.0	89.1	4.4	1.5	5.0
Fuelwood	100.0	66.9	2.6	14.6	15.9	100.0	68.8	13.0	3.4	14.9
All products	100.0	95.0	1.0	.4	3.6	100.0	88.1	6.2	.8	4.9
Rocky Mountain										
Saw logs	100.0	98.3	....	1.5	.1	100.0	97.4	....	2.3	.3
Veneer logs	100.0	98.2	....	1.6	.1	100.0	100.0	....	....	.....
Pulpwood	100.0	92.9	2.8	4.2	.2	100.0	100.0	....	....	.....
Miscellaneous industrial	100.0	90.0	.5	9.5	.1	100.0	94.7	1.7	3.3	.4
Fuelwood	100.0	18.0	1.7	80.3	....	100.0	1.3	2.3	96.4	.....
All products	100.0	95.5	.2	4.3	.1	100.0	73.4	1.3	25.0	.3
Pacific Coast										
Saw logs	100.0	94.0	.2	3.7	2.1	100.0	92.2	....	7.8	.....
Veneer logs	100.0	87.8	.6	4.8	6.7	100.0	94.7	....	5.3	.....
Pulpwood	100.0	80.2	2.9	4.1	12.9	100.0	97.1	.6	2.3	.....
Miscellaneous industrial	100.0	100.0	....	....	....	100.0	....	....	....	100.0
Fuelwood	100.0	21.4	12.9	62.9	2.8	100.0	39.9	5.1	41.7	13.3
All products	100.0	91.2	.6	4.3	3.9	100.0	88.8	.6	9.4	1.2
United States										
Saw logs	100.0	95.7	.3	2.2	1.9	100.0	93.9	3.9	.9	1.4
Veneer logs	100.0	92.2	.5	2.9	4.4	100.0	95.3	3.2	.2	1.3
Pulpwood	100.0	90.1	1.7	.8	7.3	100.0	87.1	6.4	.7	5.8
Miscellaneous industrial	100.0	94.7	.6	2.0	2.7	100.0	84.4	9.2	1.1	5.3
Fuelwood	100.0	47.8	5.0	36.4	10.7	100.0	57.8	11.6	6.9	23.8
All products	100.0	93.0	.8	2.4	3.9	100.0	86.0	6.0	1.7	6.3

[1]Fence rows, noncommercial forests, and other nongrowing stock sources.

Note: Data may not add to totals because of rounding.

Source: Appendix 3, tables 51, 56, 63, 66, and 67.

Table 5.4—*Removals from growing stock and sawtimber in the United States, by softwoods and hardwoods, kind, and section, 1976*

(Percent)

Softwoods

Section	Growing stock				Sawtimber			
	Total removals	Roundwood products	Logging residues	Other removals[1]	Total removals	Roundwood products	Logging residues	Other removals[1]
North	100.0	78.9	9.8	11.3	100.0	86.8	2.9	10.3
South	100.0	89.9	5.6	4.4	100.0	93.1	3.5	3.4
Rocky Mountain	100.0	87.3	10.8	1.5	100.0	92.7	5.7	1.6
Pacific Coast	100.0	87.8	9.9	2.3	100.0	92.7	5.1	2.2
United States	100.0	88.1	8.1	3.8	100.0	92.6	4.5	3.0

Hardwoods

Section	Growing stock				Sawtimber			
	Total removals	Roundwood products	Logging residues	Other removals[1]	Total removals	Roundwood products	Logging residues	Other removals[1]
North	100.0	64.2	13.3	22.5	100.0	82.4	5.6	12.0
South	100.0	70.9	14.1	15.0	100.0	78.3	9.8	11.8
Rocky Mountain	100.0	83.6	10.0	6.4	100.0	88.1	4.9	6.9
Pacific Coast	100.0	70.5	23.6	5.9	100.0	80.9	13.2	5.8
United States	100.0	67.8	14.0	18.2	100.0	80.2	8.1	11.7

[1]Net volume removed from inventory by cultural operations, land clearing, and changes in land use.

Note: Data may not add to totals because of rounding.

Source: Appendix 3, tables 51, 56, 63, 66, and 67.

Table 5.5—*Growing stock removals per cubic foot of roundwood product output in the United States, by softwoods and hardwoods, product, and section, 1976*

(Cubic feet)

Softwoods

Section	All products	Saw logs	Veneer logs	Pulpwood	Miscellaneous industrial	Fuelwood
North	1.109	1.166	1.184	1.075	1.047	0.479
South	1.057	1.092	1.091	1.030	1.057	.744
Rocky Mountain	1.094	1.126	1.125	1.064	1.031	.206
Pacific Coast	1.039	1.071	1.000	.913	1.139	.244
United States	1.056	1.086	1.047	1.023	1.075	.543

Hardwoods

Section	All products	Saw logs	Veneer logs	Pulpwood	Miscellaneous industrial	Fuelwood
North	1.301	1.436	1.441	1.361	1.285	.717
South	1.243	1.351	1.365	1.220	1.257	.970
Rocky Mountain	.878	1.165	1.196	1.196	1.133	.016
Pacific Coast	1.260	1.308	1.343	1.377	.....	.566
United States	1.268	1.385	1.406	1.285	1.245	.853

Source: Tables 5.3 and 5.4.

Table 5.6—*Volume of solid wood per standard unit of roundwood output in the United States, by softwoods and hardwoods, section, and product, 1976*[1]

(Cubic feet)

Softwoods

Product	Standard unit	United States	Section: North	South	Rocky Mountain	Pacific Coast
Saw logs	Thousand board feet[2]	160.0	172.1	172.5	156.0	153.4
Veneer logs and bolts	do	149.0	153.6	158.3	156.0	143.0
Cooperage logs and bolts	do	167.1	171.6	164.1	....	....
Pulpwood	Standard cord	79.2	82.8	77.5	86.0	86.5
Piling	Thousand linear feet	691.7	457.0	712.7	760.0	759.7
Posts	Thousand pieces	735.2	1,007.0	607.8	1,121.8	1,129.4
Poles	do	14,292.7	6,305.5	13,418.9	15,448.9	26,557.1
Fuelwood	Standard cord	78.2	71.8	73.8	86.0	86.7

Hardwoods

Product	Standard unit	United States	North	South	Rocky Mountain	Pacific Coast
Saw logs	Thousand board feet[2]	170.1	162.5	172.4	148.6	276.1
Veneer logs and bolts	do	164.2	156.0	165.2	152.2	277.8
Cooperage logs and bolts	do	153.9	155.4	147.0	....	....
Pulpwood	Standard cord	79.4	81.8	77.7	86.0	85.5
Piling	Thousand linear feet	551.2	551.2	....	....	....
Posts	Thousand pieces	759.7	791.2	650.3	....	2,800.0
Poles	do	18,238.1	18,238.1	....	....	....
Fuelwood	Standard cord	73.2	70.8	75.0	86.0	86.9

[1]Factors for timber supply regions weighted by 1976 output.
[2]International ¼-inch log rule.

Source: Appendix 3, tables 51, 56, 63, 66, and 67.

Table 5.7—*Metric volume of solid wood per standard unit of roundwood output in the United States, by softwoods and hardwoods, section, and product, 1976*[1]

(Cubic meters)

Softwoods

Product	Standard unit	United States	Section: North	South	Rocky Mountain	Pacific Coast
Saw logs	Thousand board feet[2]	4.531	4.873	4.885	4.417	4.344
Veneer logs and bolts	do	4.219	4.349	4.483	4.417	4.049
Cooperage logs and bolts	do	4.732	4.859	4.647	....	....
Pulpwood	Standard cord	2.243	2.345	2.195	2.435	2.449
Piling	Thousand linear feet	19.587	12.941	20.182	21.521	21.512
Posts	Thousand pieces	20.819	28.515	17.211	31.766	31.981
Poles	do	404.726	178.553	379.983	437.466	752.017
Fuelwood	Standard cord	2.214	2.033	2.090	2.435	2.455

Hardwoods

Product	Standard unit	United States	North	South	Rocky Mountain	Pacific Coast
Saw logs	Thousand board feet[2]	4.817	4.602	4.882	4.208	7.818
Veneer logs and bolts	do	4.650	4.417	4.678	4.310	7.866
Cooperage logs and bolts	do	4.358	4.400	4.163	....	....
Pulpwood	Standard cord	2.248	2.316	2.200	2.435	2.421
Piling	Thousand linear feet	15.608	15.608	....	....	....
Posts	Thousand pieces	21.512	22.404	18.415	....	79.288
Poles	do	516.448	516.448	....	....	....
Fuelwood	Standard cord	2.073	2.005	2.124	2.435	2.461

[1]Factors for timber supply regions weighted by 1976 output.
[2]International ¼-inch log rule.

Source: Table 5.6 (1 cubic meter=35.3145 cubic feet).

Table 5.8—*Saw log conversion factors in the United States, by softwoods and hardwoods and section, 1976*[1]

Section	Cubic feet solid wood per— Thousand board feet, International ¼-inch log rule	Cubic feet solid wood per— Thousand board feet, local log rule[2]	Cubic feet solid wood per— Thousand board feet, lumber tally	Board feet, International ¼-inch log rule per thousand board feet local rule[2]	Board feet lumber tally per— Thousand board feet, International ¼-inch log rule	Board feet lumber tally per— Thousand board feet, local log rule[2]
Softwoods						
North	172.1	174.1	172.6	1,012	997	1,009
South	172.5	227.7	174.5	1,320	989	1,305
Rocky Mountain	156.0	175.0	161.0	1,122	969	1,087
Pacific Coast	153.4	170.3	145.0	1,110	1,058	1,174
United States	160.0	185.0	156.0	1,156	1,026	1,186
Hardwoods						
North	162.5	207.2	163.5	1,275	994	1,276
South	172.4	228.2	161.2	1,324	1,069	1,416
Rocky Mountain	148.6	174.3	160.8	1,174	924	1,084
Pacific Coast	276.1	297.6	265.3	1,078	1,041	1,122
United States	170.1	220.4	165.1	1,296	1,030	1,335

[1]Factors for timber supply regions weighted by 1976 output.
[2]Local log rule, *Softwoods:* Northeast—International ¼-inch, North Central—Scribner, Southeast—Scribner, South Central—Doyle, Rocky Mountain and Pacific Coast—Scribner.
Hardwoods: Lake States—Scribner, other North—Doyle, South—Doyle, Rocky Mountain and Pacific Coast—Scribner.

Table 5.9—*Veneer log conversion factors in the United States, by softwoods and hardwoods and section, 1976*[1]

Section	Cubic feet solid wood per— Thousand board feet, International ¼-inch log rule	Cubic feet solid wood per— Thousand board feet, local log rule[2]	Cubic feet solid wood per— Thousand square feet veneer[3]	Board feet, International ¼-inch log rule per thousand board feet local rule[2]	Square feet veneer[3] per— Thousand board feet, International ¼-inch log rule	Square feet veneer[3] per— Thousand board feet, local log rule[2]
Softwoods						
North	153.6	153.6	55.0	1,000	2,793	2,793
South	158.3	211.5	57.6	1,336	2,748	3,672
Rocky Mountain	156.0	174.5	60.6	1,119	2,574	2,880
Pacific Coast	143.0	166.2	60.6	1,162	2,360	2,743
United States	149.0	181.0	59.4	1,215	2,508	3,047
Hardwoods						
North	156.0	201.5	59.1	1,291	2,640	3,409
South	165.2	206.0	49.6	1,247	3,331	4,153
Rocky Mountain	152.2	.....	.....	.....	.....	.....
Pacific Coast	277.8	300.3	86.3	1,081	3,291	3,480
United States	164.2	206.6	55.2	1,258	2,975	3,743

[1]Factors for timber supply regions weighted by 1976 output.
[2]Local log rule, *Softwoods:* Northeast—International ¼-inch, Southeast—Scribner, South Central—Doyle, Rocky Mountain and Pacific Coast—Scribner.
Hardwoods: Lake States—Scribner, other North—Doyle, South—Doyle, Rocky Mountain and Pacific Coast—Scribner.
[3]Dry, untrimmed veneer, ⅜-inch thickness.

Table 5.10—*Saw log and veneer log metric conversion factors in the United States, by softwoods and hardwoods and section, 1976*[1]

(Cubic meters, solid wood)

Softwoods

Section	Saw logs: Cubic meters solid wood per— Thousand board feet, International ¼-inch log rule	Saw logs: Thousand board feet, local log rule	Saw logs: Thousand board feet lumber tally	Veneer logs and bolts: Cubic meters solid wood per— Thousand board feet, International ¼-inch log rule	Veneer logs and bolts: Thousand board feet, local log rule	Veneer logs and bolts: Thousand square feet veneer[2]
North	4.873	4.930	4.888	4.349	4.349	1.557
South	4.885	6.448	4.941	4.483	5.989	1.631
Rocky Mountain	4.417	4.955	4.559	4.417	4.941	1.716
Pacific Coast	4.344	4.822	4.106	4.049	4.706	1.716
United States	4.531	5.239	4.417	4.219	5.125	1.682
Hardwoods						
North	4.602	5.867	4.630	4.417	5.706	1.674
South	4.882	6.462	4.565	4.678	5.833	1.405
Rocky Mountain	4.208	4.936	4.553	4.310	.....	.....
Pacific Coast	7.818	8.427	7.512	7.866	8.504	2.444
United States	4.817	6.241	4.675	4.650	5.850	1.563

[1]Factors for timber supply regions weighted by 1976 output.
[2]Dry, untrimmed, ⅜-inch thickness.

Source: Tables 5.8 and 5.9 (1 cubic meter=35.3145 cubic feet).

Table 5.11—*Timber product yields and raw material requirements in the United States, by product, 1976*[1]

Product	Standard unit	Solid volume of product in standard unit: Cubic feet	Solid volume of product in standard unit: Cubic meters	Raw material required per unit of product[2]: Cubic feet	Raw material required per unit of product[2]: Cubic meters	Ratio of raw material volume to volume of product[3]	Solid volume of product as a percent of raw material volume
Lumber							
Softwood	Thousand board feet	[4]60.00	1.700	156.0	4.417	2.60	38.5
Hardwood	do	[5]81.22	2.300	165.1	4.675	2.03	49.3
Veneer[6]							
Softwood	Thousand square feet ⅜-inch thickness	31.25	.885	59.4	1.682	1.90	52.6
Hardwood	do	31.25	.885	55.2	1.563	1.77	56.5
Plywood							
Softwood	Thousand square feet ⅜-inch thickness	31.25	.885	69.9	1.979	2.24	44.6
Hardwood	do	31.25	.885	[8]62.7	[8]1.776	[8]2.01	49.8
Particleboard[7]	Thousand square feet ¾-inch thickness	62.50	1.770	91.1	2.580	1.46	([9])
Hardboard	Thousand square feet ⅛-inch thickness	10.42	.295	15.3	.433	1.47	([9])
Insulating board	Thousand square feet ½-inch thickness	41.67	1.180	19.1	.541	.46	([9])

[1]Average of all timber supply regions.
[2]Roundwood equivalent.
[3]Cubic feet (cubic meters) roundwood equivalent per cubic foot (cubic meter) of product.
[4]Average for all softwood production. Mostly surfaced, dry.
[5]Average for all hardwood production. Mostly rough, dry.
[6]Dry, untrimmed veneer.
[7]Includes medium-density fiberboard.
[8]Assumes that hardwood plywood is composed entirely of hardwood materials. Bureau of Census data indicate that about 40 percent of the logs, bolts, flitches, and purchased veneer consumed in manufacture of hardwood plywood is softwood material used for backs and inner plies. At a mix of 60 percent hardwood and 40 percent softwood, 65.6 cubic feet (1.858 cubic meters) of raw material would be required per thousand square feet, ⅜-inch thickness, of hardwood plywood—37.6 cubic feet of hardwood and 28.0 cubic feet of softwood.
[9]Not applicable.

Table 5.12—*Woodpulp conversion factors in the United States, by pulping process, 1978*[1]

Pulping process	Pulpwood consumption per short ton			Pulpwood consumption per metric ton[2]		
	Cords	Cubic feet[3]	Cubic meters[4]	Cords	Cubic feet[3]	Cubic meters[4]
Chemical	1.677	132.5	3.752	1.849	146.1	4.136
Sulfite	1.777	140.4	3.975	1.959	154.8	4.380
Sulfate	1.649	130.3	3.690	1.818	143.6	4.065
Dissolving	2.276	179.8	5.091	2.509	198.2	5.612
Groundwood	.860	67.9	1.924	.948	74.8	2.119
Semichemical	.983	77.7	2.199	1.084	85.6	2.424
Defibrated or exploded	.812	64.1	1.816	.895	70.7	2.002
All processes	1.493	117.9	3.340	1.646	130.0	3.682

[1]Based on U.S. Department of Commerce, Bureau of the Census. *Current industrial reports.* M26A(78)-13, March 1980.
[2]1 metric ton=1.1023 short tons.
[3]1 cord=79 cubic feet solid wood.
[4]1 cubic meter=35.3145 cubic feet.

Table 5.13—*Weights of timber products in the United States, 1978*

Product	Unit	Weight of wood per standard unit[1]	
		Short tons	Metric tons
Roundwood products[2]			
Softwood	Thousand cubic feet	[5]17.500	[5]15.876
Hardwood	do	[6]20.000	[6]18.144
Lumber			
Softwood[3]	Thousand board feet	.960	.871
Hardwood[4]	do	1.660	1.506
Plywood			
Softwood	Thousand square feet	.537	.487
Hardwood	⅜-inch thickness	.657	.596
Particleboard	Thousand square feet ¾-inch thickness	[7]1.473	[7]1.336
Hardboard	Thousand square feet ⅛-inch thickness	[7].238	[7].216
Insulating board	Thousand square feet ½-inch thickness	[7].298	[7].270

[1]Air dry weight—15 percent moisture content.
[2]Logs, bolts, pulpwood, fuelwood, and miscellaneous industrial roundwood.
[3]Average for all softwood production. Mostly surfaced, dry.
[4]Average for all hardwood production. Mostly rough, dry.
[5]At 35 pounds per cubic foot, air dry.
[6]At 40 pounds per cubic foot, air dry.
[7]Weight of wood, only. Resins, waxes, and other additives not included.

Source: U.S. Department of Agriculture, Forest Service. *Wood handbook*, Handbk. No. 72, 1955.

Appendix 6
Glossary

Bureau of Land Management land—Federal lands administered by the Bureau of Land Management, U.S. Department of the Interior.

Commercial forest land—See Commercial timberland.

Commercial species—Tree species suitable for industrial wood products.

Commercial timberland—Forest land which is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. (Note: Areas qualifying as commercial timberland have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently, inaccessible and inoperable areas are included.)

Cord—A pile of stacked wood containing 128 cubic feet within its outside surfaces. The standard dimensions are 4 by 4 by 8 feet.

Cropland—Land under cultivation within the past 24 months, including cropland harvested, crop failures, cultivated summer fallow, idle cropland used only for pasture, orchards, and land in soil improving crops, but excluding land cultivated in developing improved pasture.

Cull trees—Live trees of sawtimber and poletimber size that are unmerchantable for saw logs now or prospectively because of roughness, rot, or species (also see rotten trees and rough trees).

Deferred forest land—National Forest lands that meet productivity standards for commercial forest, but are under study for possible inclusion in the Wilderness System.

Diameter classes—A classification of trees based on diameter outside bark measured at breast height (4½ feet above ground). D.b.h. is the common abbreviation for "diameter at breast height." When using 2-inch diameter classes, the 6-inch class, for example, includes trees 5.0 through 6.9 inches d.b.h. inclusive.

Ecosystem—A complete, interacting system of organisms considered together with their environment; e.g., a marsh, a watershed, a lake, etc.

Establishment—An economic unit, generally at a single physical location where business is conducted or where services or industrial operations are performed.

Farmer and other private—All private ownerships except forest industry.

Farmer-owned lands—Lands owned by a person who operates a farm, either doing the work himself or directly supervising the work.

Forest industry lands—Lands owned by companies or individuals operating wood-using plants.

Forest land—Land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated. (Also see Commercial timberland, Productive-reserved forest land, and Other forest land.) Forest land includes transition zones, such as areas between heavily forested and nonforested lands that are at least 10 percent stocked with forest trees, and forest areas adjacent to urban and built-up lands. Also included are pinyon-juniper and chaparral areas in the West, and afforested areas. The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if less than 120 feet in width.

Forest site productivity class—A classification of forest lands in terms of potential cubic-foot volume growth per acre at culmination of mean annual increment in fully stocked natural stands.

Forest types—A classification of forest land based upon the tree species presently forming a plurality of stocking. For poletimber size trees and larger, stocking is determined from basal area occurrence and for trees less than 5.0 inches d.b.h., from number of trees.

Major eastern forest type groups:

White-red-jack pine—Forests in which eastern white, red pine, or jack pines, singly or in combination, comprise a plurality of the stocking. (Common associates include hemlock, aspen, birch, and maple.)

Spruce-fir—Forests in which spruce or true firs, singly or in combination, comprise a plurality of the stocking. (Common associates include white cedar, tamarack, maple, birch, and hemlock.)

Longleaf-slash pine—Forests in which longleaf or slash pine, singly or in combination, comprise a plurality of the stocking. (Common associates include other southern pines, oak, and gum.)

Loblolly-shortleaf pine—Forests in which loblolly pine, shortleaf pine, or southern yellow pines, except longleaf or slash pine, singly or in combination, comprise a plurality of the stocking. (Common associates include oak, hickory, and gum.)

Oak-pine—Forests in which hardwoods (usually upland oaks) comprise a plurality of the stocking but in which pine or eastern redcedar comprises 25–50 percent of the stocking. (Common associates include gum, hickory, and yellow-poplar.)

Oak-hickory—Forests in which upland oaks, or hickory, singly or in combination, comprise a plurality of the stocking except where pines comprise 25–50 percent, in which case the stand would be classified as oak–pine. (Common associates include yellow-poplar, elm, maple, and black walnut.)

Oak-gum-cypress—Bottomland forests in which tupelo, blackgum, sweetgum, oaks, or southern cypress, singly, or in combination, comprise a plurality of the stocking except where pines comprise 25–50 percent, in which case the stand would be classified oak-pine. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Elm-ash-cottonwood—Forests in which elm, ash, or cottonwood, singly or in combination, comprise a plurality of the stocking. (Common associates include willow, sycamore, beech, and maple.)

Maple-beech-birch—Forests in which maple, beech, or yellow birch, singly or in combination comprise a plurality of the stocking. (Common associtcs include hemlock, elm, basswood, and white pine.)

Aspen-birch—Forests in which aspen, balsam poplar, paper birch, or gray birch, singly or in combination, comprise a plurality of the stocking.

(Common associates include maple and balsam fir.)

Major western forest type groups:

Douglas-fir—Forests in which Douglas-fir comprises a plurality of the stocking. (Common associates include western hemlock, western redcedar, the true firs, redwood, ponderosa pine, and larch.)

Hemlock-sitka spruce—Forests in which western hemlock and/or Sitka spruce comprise a plurality of the stocking. (Common associates include Douglas-fir, silver fir, and western redcedar.)

Redwood—Forests in which redwood comprises a plurality of the stocking. (Common associates include Douglas-fir, grand fir, and tanoak.)

Ponderosa pine—Forests in which ponderosa pine comprises a plurality of the stocking. (Common associates include Jeffrey pine, sugar pine, limber pine, Arizona pine, Apache pine, Chihuahua pine, Douglas-fir, incense cedar, and white fir.)

Western white pine—Forests in which western pine comprises a plurality of the stocking. (Common associates include western redcedar, larch, white fir, Douglas-fir, lodgepole pine, and Engelmann spruce.)

Lodgepole pine—Forests in which lodgepole pine comprises a plurality of the stocking. (Common associates are alpine fir, western white pine, Engelmann spruce, aspen, and larch.)

Larch—Forests in which western larch comprises a plurality of the stocking. (Common associates are Douglas-fir, grand fir, western redcedar, and western white pine.)

Fir-spruce—Forests in which true firs (Abies spp.), Engelmann spruce, or Colorado blue spruce, singly or in combination, comprise a plurality of the stocking. (Common associates are mountain hemlock and lodgepole pine.)

Hardwoods—Forests in which aspen, red alder, or other western hardwoods, singly or in combination, comprise a plurality of the stocking.

Chaparral—Forests of heavily branched dwarfed trees or shrubs, usually evergreen, the crown canopy of which at maturity covers more than 50 percent of the ground and whose primary value is watershed protection. The more common chaparral constituents are species of *Quercus, Cercocarpus, Garrya, Ceanothis, Arctostaphylos,* and *Adenostoma.* (Types dominated by such shrubs as *Artemisia, Chrysothamnus, Purshia, Gutierrezia,* or semidesert species are not commonly considered chaparral.)

Pinyon-juniper — Forests in which pinyon pine and/or juniper comprise a plurality of the stocking.

Growing-stock trees—Live sawtimber trees, poletimber trees, saplings, and seedlings meeting specified standards of quality or vigor; excludes cull trees.

Growing-stock volume—Net volume in cubic feet of live sawtimber and poletimber trees from stump to a minimum 4-inch top (of central stem) outside bark or to the point where the central stem breaks into limbs.

Growth—See Net annual growth.

Hardwoods—Dicotyledonous trees, usually broad-leaved and deciduous.

Indian lands—Tribal lands held in fee by the Federal Government but administered for Indian tribal groups, and Indian trust allotments.

Industrial wood—All commercial roundwood products except fuelwood.

Land area—Census definition: The area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres of area. Resources Evaluation definition: Same as above except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Logging residues—The unused portions of poletimber and sawtimber trees cut or killed by logging.

Mortality—The volume of sound wood in trees that have died from natural causes during a specified period.

National Forest System land—Federal lands designated by Executive Order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service including experimental areas and Bankhead–Jones Title III lands.

Net annual growth—The net increase in the volume of trees during a specified year. Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the minimum size class during the year, minus the volume of trees that died during the year, and minus the net volume of trees that became rough or rotten trees during the year.

Net volume in board feet—The gross board-foot volume of trees less deductions for rot or other defect affecting use for lumber.

Net volume in cubic feet—Gross volume in cubic feet less deductions for rot, roughness, and poor form. Volume is computed for the central stem from a 1-foot stump to a minimum 4.0-inch top diameter outside bark, or to the point where the central stem breaks into limbs.

Noncommercial species—Tree species of typical small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial wood products.

Nonforest land—Land that has never supported forests and lands formerly forested where use of timber management is precluded by development for other uses. (Note: Includes area used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as nonforest land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide, and clearings, etc., more than 1 acre in size, to qualify as nonforest land.)

Nonstocked areas—Commercial timberland less than 10 percent stocked with growing-stock trees.

Other Federal land—Federal land other than lands administered by the Forest Service or the Bureau of Land Management.

Other forest land—Forest land incapable of producing 20 cubic feet per acre of industrial wood under natural conditions because of adverse site conditions such as sterile soils, dry climate, poor drainage, high elevation, steepness, or rockiness.

Other land—All land area other than forest and range lands.

Other private land—Privately-owned land other than forest industry or farmer-owned.

Other public land—Publicly-owned land other than National Forest System land.

Other removals—The net volume of growing-stock trees removed from the inventory by cultural operations such as timber-stand improvement, by land

clearing, and by changes in land use, such as a shift to wilderness.

Ownership—The property owned by one owner, including all parcels of land in the United States.

Pasture—Land which is currently improved for grazing by cultivation, seeding, or irrigation.

Plant byproducts—Wood material from primary manufacturing plants (such as slabs, edgings, trimmings, miscuts, sawdust shavings, veneer cores and clippings, and pulp screenings) that are used for some products.

Poletimber stands—Stands at least 10 percent stocked with growing-stock trees, of which half or more of the stocking is sawtimber and/or poletimber trees with poletimber stocking exceeding that of sawtimber. (See definition for Stocking.)

Poletimber trees—Live trees of commercial species at least 5.0 inches in diameter breast height but smaller than sawtimber size, and of good form and vigor.

Potential growth—The average net annual growth per acre attainable in fully stocked natural stands at culmination of mean annual growth of dominant or codominant trees.

Primary manufacturing plants—Plants using roundwood products such as sawlogs, pulpwood bolts, veneer logs, etc.

Productive-reserved forest land—Productive public forest land withdrawn from timber utilization through statute or administrative regulations.

Productivity class—A classification of forest land in terms of potential growth in cubic feet of fully stocked natural stands.

Rangeland—Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs, including land revegetated naturally or artificially that is managed like native vegetation. Rangeland includes natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows that are less than 10 percent stocked with forest trees of any size.

Removals—The net volume of growing-stock or sawtimber trees removed from the inventory by harvesting; cultural operations, such as timber stand improvement; land clearings; or changes in land use.

Residues:

Coarse residues—Plant residues suitable for chipping, such as slabs, edgings, and ends.

Fine residues—Plant residues not suitable for chipping, such as sawdust, shavings, and veneer clippings.

Logging residues—The unused portions of sawtimber and poletimber trees cut or killed by logging.

Plant residues—Wood materials from primary manufacturing plants that are not used for any product.

Urban residues—Wood materials from urban areas, such as newspapers, lumber and plywood from building demolition, and used packaging and shipping wood materials.

Rotten trees—Live trees of commercial species that do not contain a sawlog now or prospectively, primarily because of rot (e.g., when rot accounts for more than 50 percent of the total cull volume).

Rough trees—(a) Live trees of commercial species that do not contain a saw log, now or prospectively, primarily because of roughness, poor form, splits, and cracks, and with less than one-third of the gross tree volume in sound material; and (b) all live trees of noncommercial species.

Roundwood equivalent—The volume of logs or other round products required to produce the lumber, plywood, woodpulp, paper, or other similar products.

Roundwood logs—Logs, bolts, or other round sections cut from trees.

Salvable dead trees—Standing or down dead trees that are considered currently or potentially merchantable by regional standards.

Saplings—Live trees of commercial species 1.0 inch to 5.0 inches in diameter at breast height and of good form and vigor.

Sapling and seedling stands—Stands at least 10 percent occupied with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

Sawlog—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, and with a minimum diameter inside bark for softwoods of 6 inches (8 inches for hardwoods) or other combinations of size and defect specified by regional standards.

Sawlog portion—That part of the bole of sawtimber trees between the stump and the sawlog top.

Sawlog top—The point on the bole of sawtimber trees above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches d.o.b. for softwoods, and 9.0 inches d.o.b. for hardwoods.

Sawtimber stands—Stands at least 10 percent occupied with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Sawtimber trees—Live trees of commercial species containing at least one 12-foot sawlog or two noncontiguous 8-foot logs, and meeting regional specifications for freedom from defect. Softwood trees must be at least 9 inches in diameter and hardwood trees 11 inches in diameter at breast height.

Sawtimber volume—Net volume of the sawlog portion of live sawtimber trees in board feet.

Seedlings—Established live trees of commercial species less than 1.0 inch in diameter at breast height and of good form and vigor.

Softwoods—Coniferous trees, usually evergreen, having needles or scalelike leaves.

Special interest areas—Areas described in the Environmental Policy Act of 1970 which include (1) cultural areas—historic or prehistoric sites and places of obvious future historical value, and (2) natural areas—outstanding examples of the Nation's geological and ecological features.

Standard error—An expression of the degree of confidence that can be placed on an estimated total or average obtained by statistical sampling methods. Sampling errors do not include technique errors that could occur in photo classification of areas, measurement of volume, or compilation of data.

Stand improvement—Measures such as thinning, pruning, release cutting, girdling, weeding, or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees.

Stand–size classes—A classification of forest land based on the predominant size of timber present. See Poletimber stands, Sapling–seedling stands, and Sawtimber stands.

State, county, and municipal lands—Lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Stocking—The degree of occupancy of land by trees, measured by basal area and/or number of trees by size and

spacing, compared to a stocking standard; i.e., the basal area and/or number of trees required to fully utilize the growth potential of the land.

Upper-stem portion—That part of the main stem or fork of sawtimber trees above the sawlog to a minimum top diameter of 4.0 inches outside bark or to the point where the main stem or fork breaks into limbs.

Urban and other areas—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; school yards; cemeteries; roads; railroads; airports; beaches, powerlines, and other rights-of-way; or other nonforest land not included in any other specified land use class.

Wilderness—An area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation: (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value (from Wilderness Act 1964).